

# THE MEDICAL NEWS.

A WEEKLY JOURNAL OF MEDICAL SCIENCE.

VOL. LIX.

SATURDAY, NOVEMBER 7, 1891.

No. 19.

## ORIGINAL ARTICLES.

### **A CASE OF ACUTE SPINAL PARALYSIS; DEATH ON THE TWELFTH DAY; AUTOPSY SHOWING TRANSVERSE CERVICAL MYELITIS.<sup>1</sup>**

BY WHARTON SINKLER, M.D.

*With a Report of the Microscopical Examination,*

BY C. W. BURR, M.D.

THE following case is of interest because, while having the clinical history both of acute poliomyelitis anterior and of Landry's paralysis, the post-mortem results show a transverse myelitis involving only the cervical portion of the cord:

The patient was a well-grown young man, eighteen years of age, of good habits, and without hereditary history of consumption or nervous disease. He was an only child, and had enjoyed excellent health until July, 1890. On the 10th of this month he went to New York for the day, and in the afternoon went to Coney Island. During the day the weather was intensely hot, but by evening there was a great change in the temperature, the thermometer falling several degrees. He suffered extremely from the cold, feeling chilled through. The next day he returned home to Philadelphia, and felt very weak. The day following he was a little feverish, and complained of general weakness and relaxation, with a sense of general numbness, especially from the hips down. He tottered a little in his walk, and had some cramp-like pains in the calves of his legs. He had a little pain in his back and head, and was drowsy and dull. There was some diarrhea. There was pain on movement, and when sitting, his legs seemed as if "asleep." The next day, July 12th, he was worse; he could not walk, his legs being too weak. In the evening of this day he found that there was some loss of power in his arms. This loss of power increased steadily, and by July 14th he was unable to move his legs at all, though still able to lift the arms and move the hands and fingers. There was temporary inability to void urine, and a little difficulty in swallowing. The bowels were moved by enemata.

On July 18th I saw the patient in consultation with Dr. Radcliffe Cheston, who gave me the foregoing history. The patient had been confined to bed for a week, and was steadily losing strength. I made the following notes of his condition: "There is slight paralysis of the left side of the face. He cannot whistle, and smiling draws the face to the

right. The eyesight is good, although on the first day of his illness vision of the right eye was somewhat blurred. He can turn the head to either side; can extend it, but cannot flex it. He cannot extend either arm, but can partially adduct the arms over the chest. He can flex and extend both forearms, can pronate, but cannot supinate them; can flex, but can only partially extend the fingers. He can feebly extend the last phalanges, and can flex and extend the wrists. The grip is very feeble. He cannot raise the body or turn it to either side, owing to paralysis of the muscles of the trunk. There is complete loss of power in both legs. He cannot move a muscle, except to a slight extent the flexors and extensors of the toes. There is loss of most reflexes. The knee-jerk is entirely absent; no plantar or abdominal reflex is present, but the cremasteric and epigastric reflexes can be excited.

"Sensation is unimpaired in the upper and lower extremities, except as to compass-points. There is slight loss to these on the fingers and on the feet, the points being distinguished only when far apart. He locates well, and the pain-sense is unaffected. He says that the hands and feet feel numb and tingling, but he has no pain anywhere; on the day before, however, he had some cramp in his legs. There is no muscular tenderness or pain on pressure over the nerve-trunks. All the muscles respond to a slowly interrupted faradic current. The thigh muscles do not react as readily to the current as the other muscles. Speech is unaffected, but his voice is weak. He is much annoyed by accumulation of mucus in his throat."

On July 22d the patient had a return of difficulty in swallowing, and once or twice he had to be fed through the nasal tube. The respirations had become rapid and shallow. There was retention of urine the previous day, and the catheter had to be used, but he urinated to-day without trouble. The patient gradually lost strength, and died of respiratory paralysis July 22d, twelve days after the onset of the attack. The temperature during the attack was from 100° to 101°. The post-mortem was made forty-eight hours after death, the body having been preserved in an ice-box.

#### REPORT OF AUTOPSY BY DR. C. W. BURR.

The body was of average size and weight; the abdomen was of a slightly greenish color. The scalp, the skullcap, and the dura mater were normal. The brain was of average size, and there was no edema or congestion. The convolutions showed no marked deviations from the common type. On cutting into the brain the gray and white matter showed well, and were of good consistency. The basal ganglia, pons, and medulla were healthy.

<sup>1</sup> Read at the meeting of the American Neurological Association held in Washington, D. C., September 22 to September 25, 1891.

The sciatic nerves were also healthy. The bones of the base of the skull and of the spinal canal showed no evidence of disease.

The spinal meninges were normal, and there was no excess of spinal fluid. The cord was of good color, form, and consistency throughout, except for apparent slight softening in the lower dorsal region, due probably to post-mortem change. On cross-section the gray and white matter were throughout well differentiated, as well in the dorsal as in the other regions. There was possibly some congestion at the cervical swelling.

After hardening for three months in Müller's fluid the following conditions were found: The cervical swelling still showed well the differentiation between white and gray matter, but it was crumbly and brittle, and irregular longitudinal fissures appeared in several places, notably in the posterior half (these occurred during hardening). It was misshapen in outline. The staining was normal throughout. The remainder of the cord, brain, etc., showed nothing abnormal.

#### *Microscopical Examination.*

Pieces were imbedded in celloidin and sections stained with carminate of soda and with Congo-red, and a few by Pal's method.

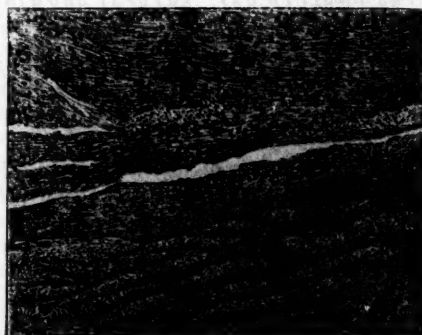
*Cervical swelling.* There was marked infiltration by small, round, sometimes irregularly shaped, deeply stained cells, which invaded the entire transverse section of the cord. Their distribution was not uniform, and the position of greatest intensity varied with the level of the section. In the center of the anterior gray matter on one side and posteriorly on the other were found small areas of hemorrhage and softening. There was some engorgement of capillaries. A few of the motor cells were shrunken and without processes, but most of them were normal in every respect—in form, intensity of staining, processes, appearance of protoplasm, and character of nuclei. Here and there, in irregularly-distributed spots, the nerve fibers had disappeared, but quite the larger number were still present. The pia and the posterior nerve-roots, especially the latter, were involved in the cellular infiltration. The vertical extent of the lesion was about one inch—sections from other portions of the cord, from the medulla and pons, and from the brain and sciatic nerves, showing nothing pathological.

Pathologically, the case is one of acute transverse myelitis, involving the upper part of the cervical swelling. The palsy of respiration may have been due to chemical changes sufficient to inhibit function, but not sufficient to cause material alteration of structure. The abdominal and thoracic viscera were not examined.

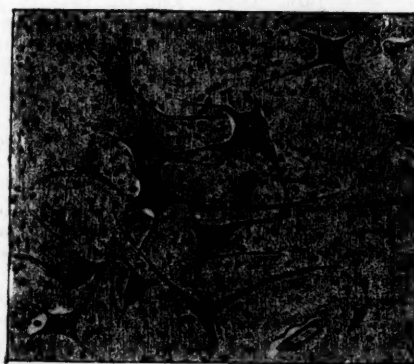
The accompanying illustrations made after drawings by Dr. Allen J. Smith clearly show the appearances described.

From a study of the clinical features of the case the diagnosis lies between acute multiple neuritis, acute myelitis, Landry's paralysis, and polio-myelitis anterior. Multiple neuritis can be excluded because of the absence of pain in the nerve trunks, the

absence of hyperesthesia, the fact that sensibility was so little disturbed, the early loss of the reflexes, and the rapid course of the disease. Acute myelitis is accompanied with early loss of power in the sphincters, exaggerated reflexes if the disease is above the lumbar enlargement, pain in the back, contraction of the limbs, and trophic changes in the skin—symptoms all absent in this case. The symptomatology of Landry's paralysis closely resembles that



From posterior root zone.



Anterior horn, showing cellular infiltration.

of my patient, but I believe that in the typical form of acute ascending paralysis the loss of power begins in the lower extremities and spreads systematically upward. In my case, although the paralysis did begin in the legs, the loss of power in the rest of the voluntary muscles came on almost simultaneously. Still, I admit that without a post-mortem examination it would have been next to impossible to say that the case was not one of Landry's paralysis. Dr. Henry Hun read before the New York Neurological Society a valuable paper on the pathology of acute ascending paralysis.<sup>1</sup> The case reported by him is so strikingly like the one I have related that I will give it at some length.

<sup>1</sup> Journal of Nervous and Mental Disease, June, 1891.

An unmarried man of forty-five years, free from any syphilitic or rheumatic taint, was suddenly attacked, April 11, 1890, by a paresis of the legs, which in the space of four days became a complete paralysis, and then in a few days more there was loss of power in the arms and hands. He had a difficulty in speech. It was necessary to draw the urine with a catheter. The bowels were constipated. This seemed due rather to weakness of the abdominal muscles than to paralysis of the bladder and rectum. He was admitted to the Albany Hospital April 18, 1890. Ten days after the beginning of weakness in the legs Dr. Hun made the following note of the patient's condition: "Well nourished. Ptosis of right eyelid, which he says is voluntary and due to impairment of vision. This impairment of vision seems to consist of diplopia, one object being to the right of and lower than the other. Decided paralysis of lower branch of left facial nerve. Tongue protruded straight, no tremor of tongue or lips, and no muscular atrophy or fibrillary contraction. Breath very offensive and tongue covered with a white coat. He can whistle with difficulty. Speech thick and indistinct. Deglutition so difficult that he has to be fed with stomach tube. Mucus collects in trachea and patient can eject it very imperfectly. Hearing, smell, and taste are normal. Grasp of left hand *nil*. Grasp of right hand very feeble. Flexors and extensors of upper arm very feeble, but more powerful than those of forearm. Muscles of shoulder feeble, but more powerful than those of arm. Muscles of body paralyzed so that he can neither sit up nor move in bed. Absolute motor paralysis of both legs and thighs. Absence of plantar, cremasteric, umbilical, and patellar reflexes. No muscular tenderness, fibrillary contraction, or atrophy. No disturbance of sensibility, tactile (tested with pin-head and cotton), thermic, or painful impressions anywhere. No retardation of conduction of pain. Bladder and rectum inactive. Urine drawn off with catheter. Bowels moved by castor oil or by injection. Temperature and pulse normal. On April 22d, the muscles of both arms are much weaker, and those of the right arm and shoulder are weaker than those of the left, so that he can scarcely move the right arm at all. The muscles of the legs continue completely paralyzed. There is nowhere any muscular atrophy, tremor, or disturbance of any kind of sensibility, and there is no muscular tenderness. All the muscles of both legs respond decidedly and quickly to the faradic current. The difficulty of speech and respiration is so great that it does not seem possible that he can live twenty-four hours."

The patient died April 23d, five days after admission to the hospital, and twelve days after the beginning of loss of power in the legs.

"An autopsy was held eight hours after death. The spinal cord seemed normal, except that the lumbar portion seemed to be slightly edematous, and the outlines of the gray matter in this region seemed a little less clear than normal. The brain seemed normal, except that there was a somewhat increased amount of subarachnoid fluid over both parietal regions."

"A microscopical examination made by Dr. Van

Gieson showed that there were a slight cerebral and spinal meningitis and infiltration of the walls of some of the veins of the spinal pia mater, and a degeneration (or neuritis) of some of the fibers of the anterior roots of the cauda equina, the nervous system in other respects being normal."

R. T. Williamson, M.D., has reported a case of acute anterior polio-myelitis in a young man, twenty-two years old, who died five weeks after the onset of the attack.<sup>1</sup> The case is as follows:

The patient, aged twenty-two years, consulted Dr. Pullon. When first seen he complained of a numb feeling in the right hand. The next day this had extended to the right leg and also to the left side. The right arm became paralyzed, then the left, and on the third day there was complete paralysis of both arms and legs. There was also pain in the back and slight pain in the limbs. The kneejerks were absent; there was no anesthesia anywhere. The bladder and rectum were not affected. Rapid atrophy of the muscles of the limbs occurred after the first ten days of the illness. He remained in this paralyzed condition for about three weeks, then he began to improve. He regained slight power of movement in the toes, and there was slight return of power of movement in both arms. For financial reasons he was admitted as a patient at the Victoria Hospital, Burnley, England. The day following his admission he died very suddenly, before the hospital doctor could be called to see him. The entire duration of the disease was about five weeks. There was no anesthesia during the entire illness, and no affection of the bladder and rectum. The post-mortem examination was made by Dr. Woodyatt, the house-surgeon of the Burnley Hospital.

The spinal cord before section was normal in appearance, and so were the meninges. The cause of the sudden death was not discovered. Portions of the cervical, dorsal, and lumbar regions of the spinal cord, and pieces of the sciatic and ulnar nerves, were placed in bichromate of potash solution and sent to me for microscopical examination. To the naked eye the cord on section appeared normal, with the exception of the anterior horns of gray matter, which were of a slightly lighter color than the rest of the gray matter. The specimens were hardened in bichromate of potash solution and imbedded in celloidin. Transverse sections were cut and stained with logwood, anilin blue-black, osmic acid, Weigert's stain, etc. On microscopical examination of the spinal cord changes were found in each anterior horn of the gray matter in all three regions, cervical, dorsal, and lumbar, the most marked being those in the lumbar region, those in the dorsal, however, but slight. The changes occupied almost exactly the same position in all three regions, viz., the outer part of each anterior horn. The rest of the gray matter was not affected. In a transverse section of the lumbar region, stained with logwood, the outer half of each anterior horn of the gray matter was seen to be infiltrated by a mass of

<sup>1</sup> Medical Chronicle, September, 1890, page 454.



closely packed round cells. The cell-nuclei stained well with logwood. Under a low power the stained cell-nuclei were seen to be more numerous around the periphery of the patch than at the center. Also the center of the cell-infiltration had a tendency to break up and fall out of the sections.

A line drawn transversely across the cord through the central canal would roughly limit the post-anterior part of the patch of cell-infiltration, and a line drawn in the antero-posterior direction through the center of the anterior horn would give roughly the inner boundary of the patch. When examined with a high power this roundish patch of cell-infiltration was seen to be composed of small, round, nucleated cells, about the size of white blood-corpuscles, and of large, round, or oval nucleated cells. There were no real hemorrhages; only here and there two or three stray red corpuscles were seen, apparently not surrounded by any capillary wall. The perivascular sheaths of all the vessels were greatly distended with round cells. The small arteries passing from the surface of the cord to the anterior horns were dilated, and the lymph-sheaths distended with round cells. This was especially the case with the lateral median and lateral anterior arteries and their branches.

*Nerve-cells.* In the lumbar region, in specimens stained according to Weigert's method or with anilin blue-black, no nerve-cells could be detected in the outer half of each anterior horn—the region of the round-cell infiltration. This corresponded to the region of the antero-lateral and postero-lateral, and the central group of ganglion cells. At the inner part of each anterior horn—the region of the anterior, the internal, and the median groups—ganglion cells were seen. Some were of normal appearance, but most, especially those in the immediate neighborhood of the patch of round-cell infiltration, were shrunken and had lost their processes.

*Anterior nerve-roots.* Transverse section. In each nerve-bundle only a few nerve fibers were seen (stained black by Weigert's method), and instead of lying close together as in health they were widely separated from each other. Between these fibers was an infiltration of small round cells, well marked in some bundles of fibers, in some only slight; in others it was absent. Between the fibers, also, were many clear, unstained, more or less circular spaces, from which the nerve-fibers had entirely disappeared. At some places the nerve-fibers were represented by large masses of myelin (stained black).

Pieces of the anterior nerve-roots, teased out, showed the white substance of Schwann broken up into irregularly-shaped masses, or into round or oval globules. The nerve-nuclei were greatly increased in number. At some spots both white substance and axis cylinder had entirely disappeared and only the external sheath was left. The posterior nerve-roots on section presented a marked contrast to the anterior nerve-roots, appearing almost normal.

In the cervical region of the cord the changes were much the same and occurred in the same position, *i. e.*, the external part of the anterior horn; they were not so well marked, however, as in the lumbar region.

In other points the description given of the lumbar region applies to the cervical region. The pia mater was normal with the exception of very slight cell-infiltration and dilatation of the vessels of the anterior part just at the region of the anterior nerve-root.

*Filum terminale.* In the anterior horns the vessels were dilated. The perivascular sheaths of some of the dilated vessels contained a considerable number of round cells. This was most marked at the outer part of each horn. The nerve-cells were normal, except that at the outer part of the anterior horn one or two nerve-cells in each section could be detected, the processes of which were not quite so distinct as in health. In all four regions of the cord the changes were most marked just at the spot where the antero-lateral artery entered the gray matter, and the perivascular sheath of this artery was nearly always distended with round cells. Sections of the cord were stained for microorganisms according to Weigert's modification of Gram's method, but none were detected.

The ulnar nerve just above the wrist, both on section and in a teased specimen, showed many degenerated fibers similar to those of the anterior root. Other fibers, however, were normal.

*The sciatic nerve.* On transverse section many fibers had a normal appearance, but in each bundle here and there were small spaces from which the nerve-fibers had disappeared. A piece of the nerve, teased, showed some degenerated fibers. Others were normal. The smaller branches of the peripheral nerves and the medulla were not preserved for microscopical examination.

The clinical histories of the three cases detailed are in most respects alike; except that in Dr. Williamson's case the course of the disease was much longer, and there had been an attempt at retrogression of the paralysis, and there was also marked atrophy of the muscles. The post-mortem findings were all different. In Dr. Hun's case no changes could be found in the cord; in my own there was myelitis of the cervical portion of the cord, and in Dr. Williamson's there was marked degeneration of the anterior horns and some changes in the nerve-cells. It seems to me probable that had my patient lived long enough there would have been some retrogression of the paralysis, and changes in the muscles, both as to atrophy and in the electrical reactions, would have taken place.

I am inclined to believe that the condition of the cord found in my case was due to the early stage of the disease at which the patient died. Had he lived as long as did Dr. Williamson's patient, it is possible there would have been less myelitis, but degeneration in the anterior horns would have been conspicuous. I think it probable that in the early stages of poliomyelitis anterior there is a hyperemia or inflammation of the cord in the affected areas that is not confined to the anterior horns. After a few days, if the course of the disease tends toward recovery,



the general myelitis disappears and the degenerative changes in the anterior horns become pronounced. The large ganglion cells become the seat of special changes; they lose their processes, shrivel, and many disappear altogether. This seems likely from the clinical history of a case of this disease. There are at first associated with the motor paralysis certain subjective sensory disturbances in the way of formication, numbness, pain in the back and limbs, and discomfort on movement. In a few days the sensory phenomena disappear—in fact they seldom last more than a week; soon after the relief of the sensory symptoms retrogression of the paralysis takes place in those limbs that are destined to recover completely.

There have been very few autopsies in the early stages of polio-myelitis anterior, and some of those that have been reported will not bear close inspection. For instance, the case reported by Charlewood Turner,<sup>1</sup> which is quoted by Gowers, Mary Putnam Jacobi, and others, does not seem to me to have been a case of polio-myelitis anterior:

The patient was a child two and one-half years of age. She had slipped in going down stairs, and had fallen on her back. For two weeks after this she had played about as usual. She then, one day, complained of being cold, became quite ill, and on the same day lost power in her legs. Three days later she could not use the arms. On admission to the London Hospital she was suffering from paralysis of all her limbs. She was anemic; there was fairly good muscular development. She lay on her side with her head thrown backward and the legs extended. The head could be rotated and bent backward, but could not be flexed without pain. There was no reflex action on tickling the soles of the feet, and *sensation over the legs was lost*. Sensation in the arms was perfect. The evacuations were passed involuntarily. Twelve days later the evacuations were still involuntary, but sensation was restored to the legs. The child died twenty-six days after admission and six weeks after the onset of the paralysis. At the autopsy there was found in the lumbar region of the cord hemorrhagic softening in the anterior horns, leaving a cavity.

Drummond's<sup>2</sup> case, the autopsy of which is the earliest on record in a case of polio-myelitis anterior, is incomplete, from the absence of clinical history:

A child, five years of age, died after an illness of six or seven hours, from respiratory paralysis. There is no mention made of loss of power in the legs or arms. At the post-mortem examination "the spinal cord in the region of the fourth and fifth cervical nerves showed undue redness in the anterior gray matter. The vessels running from the surface to the cornua were distended with blood. The microscope showed distention of capillaries and minute

extravasations in the gray substance, swelling of the neuroglial elements and of the ganglion cells, which were granular with indistinct processes. The blood-vessels were distended with blood, forming a striking feature, not only in the anterior horns, but in the anterior white columns and middle and anterior portions of the posterior columns."

Drummond lays stress upon the fact that only a limited portion of the cord was affected, that is, in the region of the fourth and fifth cervical nerves, and that the inflammation extended beyond the limits of the anterior horns. The changes were found most abundantly in the anterior cornua, but they were also found in the antero-lateral white columns and in part of the posterior horns. "In fact, the anterior cornua were only the centers of inflamed areas, which reached considerably beyond their limits. It will therefore become a question whether the name proposed by Kussmaul, and adopted by the majority of writers, anterior polio-myelitis, is really an appropriate one."

Angel Money's<sup>1</sup> case also showed that the inflammation was not confined to the anterior horns:

The patient was a child, two years of age, that died sixteen weeks after the onset of an attack of paralysis involving both legs. The autopsy "showed changes in the lumbar enlargement, distention and thrombosis of the vessels, especially in the anterior horns. The cornua were infiltrated with leucocytes. There was absence of the large multipolar and other nerve-cells. The disease was not confined to the anterior horns, but spread forward, outward, and backward. The principal focus of mischief was certainly the center of the anterior horns."

Gowers has recently reported a case<sup>2</sup> of acute polio-myelitis associated with multiple neuritis. He refers to the two varieties of neuritis that are met with, the parenchymatous and the adventitious, using the latter term to designate the variety in which the connective-tissue elements were primarily affected. "Recent research," he says, "has suggested that there are two varieties of polio-myelitis, the primary affection in one being in the nerve-cells of the anterior horns, in the other in the basic substance of gray matter."

There has been an effort made of late to attribute Landry's paralysis to acute multiple neuritis, but the cases that have been cited present the features of multiple neuritis and not those of acute ascending paralysis.

The American Electro-therapeutic Association will hold its second annual session in New York during the first week of October, 1892. Dr. William James Morton, of New York, has been elected president of the Association.

<sup>1</sup> Trans. Pathological Society of London, vol. xxx. p. 202.

<sup>2</sup> Brain, 1885, p. 15.

<sup>1</sup> Trans. Pathological Society of London, 1884.

<sup>2</sup> Clinical Society of London, and American Journ. Med. Sci. June, 1891.

**A REVIEW OF SOME OF THE MORE IMPORTANT CONTRIBUTIONS TO OUR KNOWLEDGE UPON IMMUNITY AND INFECTION.**

BY A. C. ABBOTT, M.D.,

FIRST ASSISTANT, DEPARTMENT OF HYGIENE, UNIVERSITY OF PENNSYLVANIA.

For some time past the objective point in the work of many of the most prominent investigators in the field of bacteriology has been a closer acquaintance with the phenomena of infection and immunity. These studies have been directed not only toward the methods by which these conditions may be produced in susceptible animals, but efforts have been made to determine the alterations that take place in the tissues of these animals, coincidentally with the establishment of the conditions.

It is proposed in this paper to review the principal experimental work that has been contributed to the subjects of immunity and infection during the past few years and see in how far the results accord with or refute the hypotheses that have been advanced for the explanation of these conditions.

Until the year 1888 there existed four different doctrines by which the condition of acquired immunity against infection could be accounted for. The first of these theories originated with Chaveau.<sup>1</sup> It suggests that the immunity commonly seen to exist in animals that had passed through an attack of infection against a subsequent outbreak of the same malady, and likewise the immunity that had been produced artificially, exists by virtue of some bacterial product that has been retained in the tissues of those animals, and that by its presence prevents the development of the same organisms when they subsequently gain access to the body. This is the so-called "retention hypothesis."

On the other hand, Pasteur<sup>2</sup> and certain of his pupils believed that the resistance frequently afforded to the tissues by an attack of infection, or following upon vaccination against infection, was due rather to an abstraction from the tissues, by the organisms that were concerned in the primary attack, of a something that is necessary to the growth of the organism should it gain entrance to the body at any subsequent time. This view is known as the "exhaustion hypothesis."

In 1884, Metschnikoff<sup>3</sup> published the first of a series of observations upon the relation that is seen to exist between certain of the mesodermal cells of the lower animals and insoluble par-

ticles that may be present in the tissues of these animals. The outcome of these investigations was the establishment of his well-known doctrine of phagocytosis, the principle of which is that the wandering cells of the animal organism, the leucocytes, possess the property of taking up, rendering inert, and digesting microorganisms with which they may come in contact in the tissues. Metschnikoff believed that in this way immunity against infection may in many cases be explained. He believed that susceptibility to, or immunity against infection was essentially a matter between the invading bacteria on the one hand and the leucocytes of the tissues on the other. The success or failure of the leucocytes in protecting the animal against infection depends, according to this author, entirely upon the efficiency of the means possessed by them for destroying bacteria. When these means are of sufficient vigor to bring about the death of the bacteria, the tissues are victorious, but when the poisons generated by the microorganisms are virulent enough to arrest the phagocytic action of the leucocytes, then the tissues succumb and infection results.

Another explanation for the immunity as acquired by the tissues of the animal organism is that advocated by Buchner.<sup>1</sup> Buchner suggests that in the primary infection from which the animal may have recovered there has been produced a "reactive change" in the integral cells of the body that enables them to protect themselves against subsequent inroads of the same organism.

In 1888 there appeared from the laboratory of Flügge, in Breslau, a series of contributions that had for their object the critical review of the four hypotheses for immunity that were in existence at that time.

These experiments were of the utmost importance and gave much of the impulse to most of the work upon this obscure problem that has appeared since their publication.

The outcome of these experiments, as far as they reached, was to cast a doubt upon the accuracy of the evidence upon which the existing hypotheses were based; and indeed, from their combined results, led to the conclusion that the production of immunity follows no simple or constant course, but rather that it is dependent upon a number of factors, acting singly or together.

Bearing upon the hypothesis of retention, Sirotnin<sup>2</sup> found that, in so far as culture experiments were concerned, the only products of growth of the bacteria that were in any way inimical to their further development were substances that gave rise

<sup>1</sup> Chaveau: Comptes rendus, etc., No. 91, July, 1880.

<sup>2</sup> Pasteur: Bull. de l'Acad. de Méd., 1880.

<sup>3</sup> Metschnikoff: Arbeiten aus dem zoologischen Institut der Universität Wien, 1884, Bd. v, S. 111; Fortschritte der Med., 1884, Bd. ii; Annales de l'Institut Pasteur, 1887, tome i., No. 7; Virchow's Arch., Bd. cvii.

<sup>1</sup> Buchner: Eine neue Theorie über Erzielung von Immunität gegen Infektionskrankheiten. München, 1883.

<sup>2</sup> Sirotnin: Zeitschrift für Hygiene, Bd. iv., 1888.

to alterations in the reaction of the medium in which they were growing: acids or alkalies produced by the bacteria themselves. So long as the organisms were not actually dead from exposure to these substances, correction of the abnormal reaction was followed by a further development of the organisms. Sirotinin points out also that the products of the growth of bacteria, so long as they are maintained at a neutral or only very slightly alkaline reaction, serve very well as a medium upon which to cultivate again the same organism, providing the nutritive elements have not been entirely exhausted. Sirotinin remarks that, if in such a concentrated form as we find the life-products of bacteria in the medium in which they are growing, no inhibitory compounds beyond acids and alkalies are to be detected, it is hardly probable that they are produced in the tissues of the living animal and retained there to a degree sufficient to prevent the growth of bacteria that may subsequently gain entrance to these tissues, after the disappearance of the organisms concerned in the primary invasion. On the other hand, Salmon and Smith<sup>1</sup>, Roux and Chamberland,<sup>2</sup> and others, had demonstrated that a sort of immunity against certain forms of infection may be afforded to susceptible animals by the injection into their tissues of the products of the growth of organisms that may themselves produce fatal results when present in the animal body. In the light of subsequent experiments, however, the interpretation of this phenomenon is not that claimed by the supporters of this hypothesis.

Upon a closer study of these nutritive products of bacteria, Hankin,<sup>3</sup> and Brieger and Fränkel,<sup>4</sup> have found that there exist in certain instances, bodies of a proteid nature (albumoses, Hankin; toxalbumins, Brieger and Fränkel) that are highly poisonous in their action upon the animal body. These substances, if isolated and introduced into the tissues of susceptible animals in sufficient quantity, give rise to structural alterations in the tissues of that animal quite analogous to those following the introduction of the living organisms by which they were produced. If, however, they at first be introduced in very small amounts and the doses slowly increased, not only will no marked systemic reaction appear, but the animal will acquire a condition of resistance to the subsequent pathogenic action of the organisms themselves. That this condition, which has the appearance of a simple tolerance, is

not of this nature, has been brought out by the work of Klemperer and Klemperer shortly to be described.

As to the exhaustion hypothesis of Pasteur there is as yet no evidence whatever for its support. The work of Bitter,<sup>1</sup> which was undertaken with the view of determining if, in the process of artificial and natural immunity, there occurred such an exhaustion from the tissues of material necessary to the growth of bacteria that might gain entrance to them at some later date, gave only negative results. The flesh of animals in which immunity had been produced contained all the elements necessary for the growth and nutrition of the bacteria against which the animals had been protected, just as did the flesh of non-vaccinated animals.

Has the doctrine of phagocytosis, as advanced by Metschnikoff, stood the test of experimental criticism? From the evidence now in our possession this question must be answered in the negative. The first severe blow that this theory received was given by Nuttall,<sup>2</sup> in his work upon the antibacterial action of the animal economy. In these experiments Nuttall showed positively that the part played by the leucocytes was not at all essential to the destruction of virulent bacteria in the blood of animals, but that the serum of the blood, when quite free from cellular elements, possessed this power to a degree equal to that of the blood when all the constituent parts were present. In the blood, as such, phagocytosis could be noticed, but as a rule, the bacteria presented evidence of having undergone degenerative changes before they had been taken up by the wandering cells. Contrary to the notions in existence at the time, Traube and Gscheidlen,<sup>3</sup> as far back as 1874, demonstrated that considerable quantities of septic material could be injected into the circulating blood without apparently any effect upon the animal. As a result of these experiments the question that naturally presented itself was: Does the animal organism possess the power of rendering septic organisms inert, and if so, to what extent? Their further work showed that appreciable numbers of living bacteria could be injected into the circulation of warm-blooded animals without producing any noticeable effect. Particularly was this the case with dogs. If they injected into the circulation of a dog as much as 1.5 c.c. of decomposing fluid, the blood drawn from the animal after from twenty-four to forty-eight hours showed no tendency to decompose, though it was kept under observation for a long time. They believed this power of rendering living organisms

<sup>1</sup> Salmon and Smith: *Proc. of the Biol. Soc. Washington*, vol. iii. Feb. 22, 1886.

<sup>2</sup> Roux and Chamberland: *Annales de l'Institut Pasteur*, t. i., ii., 1888 and 1889.

<sup>3</sup> Hankin: *British Med. Journal*, No. 1541, July 12, 1890, and Feb. 28, 1891.

<sup>4</sup> Brieger und Fränkel: *Berliner klin. Wochenschr.*, 1890, Bd. xxvii.

<sup>1</sup> Bitter: *Zeitschrift für Hygiene*, Bd. iv., 1888.

<sup>2</sup> Nuttall: *Zeitschrift für Hygiene*, Bd. iv., 1888.

<sup>3</sup> Traube und Gscheidlen: *Jahresbericht der Schlesischen Ges. für Cultur*, 1874; *Jahr* lii. p. 179.



inert to be possessed by the circulating blood only to a limited degree. After the injection of much larger amounts of the putrid fluid into the blood of the animal, death usually ensued in from twenty-four to forty-eight hours. The blood drawn from the animal just before death contained the living bacteria of putrefaction, and underwent decomposition. They attribute the phenomenon to the action of the "ozonized oxygen of the corpuscles of the blood."

In 1882 Rauschenbach<sup>1</sup> demonstrated that in the process of coagulation, fibrin was formed; not as a specific product of the action of the colorless elements of the blood alone, but as the result of the combined action between all animal protoplasm and healthy blood-plasma, and that in the process there was always a disintegration of the leucocytes that were present. In 1884 Groth<sup>2</sup> demonstrated further that such a disintegration of leucocytes occurred in normal, circulating blood, though here it was not accompanied by coagulation. The results of these observations suggested the question: Does such a disintegration occur when vegetable protoplasm is introduced into the blood? For the purpose of answering this question, Grohmann, a pupil of Alexander Schmidt,<sup>3</sup> undertook to study the action of the circulating blood upon the vegetable protoplasm of the bacteria.

He noticed that the clotting of the blood of the horse was very much accelerated by the addition to it of certain of the lower organisms, and that at the same time the development of the organisms was checked, and in the case of the pathogenic varieties their virulence was diminished. This was particularly the case when the anthrax bacillus was employed.

Grohmann seems to have appreciated the significance of this observation, though he took no steps to study it more closely. He remarks that the system probably possesses, in the plasma of the blood, a body having disinfectant properties (*loc. cit.*, pp. 6 and 33). This work, however, was not conducted according to the more exact methods of modern bacteriological research, so that the actual demonstration of this phenomenon must be attributed to Nuttall.

Since the publication of Nuttall's work his results have received confirmation from all sides. Fodor,<sup>4</sup>

Buchner,<sup>1</sup> Lubarsch,<sup>2</sup> Nissen,<sup>3</sup> Stern,<sup>4</sup> Prudden,<sup>5</sup> and others have continued in the same line, and have all made practically the same observations.

Buchner undertook a closer acquaintance with this phenomenon. His studies were directed to the active element by virtue of which the serum possessed this property. He demonstrated that the serum was robbed of this power by an exposure to a temperature of 55° C. for half an hour; that its efficacy as a germicide was not diminished by alternate freezing and thawing; that by dialysis with distilled water, or by extreme dilution with distilled water, its germicidal activity was diminished, or completely checked; but that an equal dilution could be made if sodium chloride solutions (0.6–0.7 per cent.) were substituted for the distilled water, without the antibacterial action of the serum losing any of its power. From this he concluded that the active element in this phenomenon is a living albumin, an essential constituent of which is sodium chloride, and which, when robbed of this salt, either by dialysis or dilution, becomes inert in its behavior toward bacteria. He found, moreover, that the activity of the serum alone against bacteria was greater than when the cellular elements of the blood were present. This he explains by the assumption that in the serum alone the germicidal element predominates, whereas in the blood, as such, outside of the body, it is still present, but is overbalanced by the nutrition offered by the disintegrated cellular elements, so that here the nutritive element is most conspicuous, and the destructive activity toward the bacteria is not so marked.

A closer study of the nature of this germicidal element in the body of animals has been made by Martin and Hankin,<sup>6</sup> who have isolated from the spleen and lymphatic glands a body—a globulin—which in solution possesses a germicidal property that corresponds in value to that seen in the normal blood-serum.

Halliburton<sup>7</sup> believes this body to be identical with fibrin-ferment because of the clotting that it brings about in the blood. Martin and Hankin oppose this view on the ground that fibrin-ferment possesses no germicidal properties, and further, that when this globulin is exposed to an extract made from the esophageal glands of the medical leech, it is not decomposed, as Haycraft<sup>8</sup> claims that fibrin-ferment is.

<sup>1</sup> Rauschenbach: "Ueber die Wechselwirkung zwischen Protoplasma und Blutplasma." Dissertation, Dorpat, 1882.

<sup>2</sup> Groth: "Ueber die Schicksale der farblosen Elemente im kreisenden Blut." Dissertation, Dorpat, 1884.

<sup>3</sup> Grohmann: "Ueber die Einwirkung des zellenfreien Blutplasma auf einige pflanzliche Mikroorganismen." Dissertation, Dorpat, 1884.

<sup>4</sup> Fodor: Centr. f. Bakteriologie u. Parasitenkunde, 1890, Bd. vii., No. 24.

<sup>1</sup> Buchner: Archiv für Hygiene, 1890, Bd. x. Hefte 1 and 2.  
<sup>2</sup> Lubarsch: Centr. f. Bakt. u. Parasitenkunde, 1889, Bd. vi. No. 18.

<sup>3</sup> Nissen: Zeitschr. für Hygiene, Bd. vi. Heft 3, 1889.

<sup>4</sup> Stern: Zeitschr. für klin. Med., Bd. viii. Hefte 1 and 2, 1890.

<sup>5</sup> Prudden: N. Y. Med. Record, 1890, vol. xxxvii. pp. 85, 86.

<sup>6</sup> Martin and Hankin: British Medical Journal, May 31, 1890.

<sup>7</sup> Halliburton: Centr. f. Bakt. u. Parasitenkunde, 1889, Bd. v. p. 817, and Bd. vi. p. 1.

<sup>8</sup> Haycraft: Proc. Royal Soc. London, vol. xxxvi. p. 498.

Similar germicidal, ferment-like globulins have been isolated from the blood by Ogata,<sup>1</sup> and in their studies upon tetanus Tizzani and Cattani<sup>2</sup> also found a body that was antagonistic to the poison produced by the organism of this disease.

Hankin believes the globulins upon which he has been working and the albuminoid bodies studied by Buchner to be identical. The most interesting, and, in the light of work that has appeared since, the most important, of Hankin's observations was not that of the power of these globulins to destroy the vitality of living organisms, but that of the relation that they bear to the poisonous, proteid products of these organisms. For example, if the poisonous products of virulent anthrax bacilli be isolated and exposed to the globulin extracted from the normal tissues, the experiments of Hankin showed a directly destructive action on the part of the bacterial products. He found that the amount of poisonous albumin that was produced by the attenuated anthrax bacilli that are employed as vaccines against the inroads of the virulent organisms was much less than that produced by organisms possessing full virulence, and he suggests that perhaps the protective influence of the inoculations that are practised by introducing into the animal the organisms that have been attenuated in virulence is due to a gradual tolerance acquired by the cells of the tissues to the action of the poison when produced in these small quantities; in the same way that a tolerance was acquired by the tissues for the venom of the rattlesnake in the experiments of Sewall,<sup>3</sup> and as is seen to follow the injection into the tissues of small quantities of hemialbumose, which in large quantities rapidly proves fatal.

Hankin concludes from his experiments that in certain cases the contest between infectious organisms and the animal body is conducted on the part of the invaders by means of the poisonous proteids that they produce acting in direct antagonism to the means of resistance possessed by the normal cells of the tissues. In the event of the bacteria gaining the ascendancy, the normal resistance of the tissues has been destroyed by the bacterial products, whereas if infection fails to occur, then the bacteria have been killed before the poisonous albumins were produced in quantities sufficient to check the normal resistance that the tissues are seen to possess.

In their studies upon diphtheria, Brieger and Fränkel<sup>4</sup> isolated from among the products of growth of the organism concerned in the etiology of this

disease a proteid body, a toxalbumin, as it is called by them, which possesses characteristics similar in nature to the albumoses isolated by Hankin. In his subsequent work Fränkel<sup>1</sup> believes himself to have demonstrated the presence of two proteids as products of growth of the bacillus of diphtheria. These bodies are opposed in their action upon susceptible animals: the one being a poisonous proteid body that is destroyed by an exposure to from 55° to 60° C. for one hour; the other, likewise a proteid body, but which is devoid of poisonous properties and is destroyed only by exposure to higher temperatures: from 65° to 70° C. This latter proteid, when introduced into the tissues of susceptible animals, possesses the power of affording immunity against diphtheria. It loses this power when heated to a temperature of 100° C. Our acquaintance with these products is as yet not sufficiently intimate to discuss with profit the view held by Fränkel as to the existence of these two physiologically distinct proteids together, as products of the growth of this organism, but his method of separating them does not appear to be all that could be desired. He obtains, from the bacterial products containing the two albumins together, the one that possesses the protective power, by subjecting them to a temperature sufficiently high to completely destroy the poisonous body, but not high enough to render inert the other. That is to say, the body that he obtains after an exposure of the mixture to a temperature of from 65° to 70° C., and which is seen to afford immunity against diphtheria to guinea-pigs, he claims to be entirely distinct from the poisonous proteid believed by him to be destroyed before this temperature is reached. It does not seem impossible that, instead of the poisonous body having been destroyed by the high temperature, its physiological activity was simply modified by it, resulting in the appearance of the substance that is now without poisonous peculiarities, but which has the characteristic referred to—of affording immunity.

An epoch may be said to have been reached with the work of Behring and Kitasato<sup>5</sup> upon the production of immunity to tetanus. In their studies upon the blood of animals subjected to these experiments it was found that it was not only possible to render animals immune to this disease (the method has not yet been published), but that the serum of the blood of these immunized animals is seen to afford immunity when injected into the peritoneal cavity of other animals that have not been so protected; and moreover, that this serum possesses curative powers over the disease after it

<sup>1</sup> Ogata: *Centr. f. Bakt. u. Parasitenkunde*, 1891, Bd. ix. p. 599.

<sup>2</sup> Tizzani und Cattani: *Centr. f. Bakt. u. Parasitenkunde*, 1891, Bd. ix. p. 685.

<sup>3</sup> Sewall: *Journal of Physiology*, 1887, vol. viii. p. 203.

<sup>4</sup> Loc. cit.

<sup>1</sup> Fränkel (C.): *Berliner klin. Wochenschr.*, 1890, Bd. xxvii. p. 1133-1135.

<sup>2</sup> Behring und Kitasato: *Deutsche med. Wochenschr.*, 1890, Bd. xvi. p. 1113.

had, in some cases, been in progress for a time. They found, further, that the serum of animals that had been rendered immune to tetanus, when brought in contact with the poison of tetanus, completely destroyed its poisonous properties, and that the serum from animals or from human beings who do not possess immunity to this disease has no such power.

Perhaps of greatest importance as a contribution to our knowledge upon infection and immunity is the work of Klemperer and Klemperer.<sup>1</sup> Their experiments bore entirely upon the nature of the infection in acute fibrinous pneumonia, and have shed much light upon some of the obscure features of that disease. They found but little difficulty in affording immunity to animals that are otherwise susceptible to the pathogenic action of the organisms concerned in the production of this disease,<sup>2</sup> by the introduction into their tissues of the products of growth of the organisms from which the latter had been separated. The immunity thus produced is seen in some cases to last as long as six months; again, it is seen to disappear suddenly in a way not to be explained. It was seen in one case to be hereditary.

The energy of the substance that has the power of affording immunity was seen to be very much increased by subjecting it to temperatures somewhat higher than that at which it was produced by the bacteria: 37.5° C. Klemperer and Klemperer found that if this substance was heated to a temperature of from 41° to 42° C. for three or four days, or to 60° C. for from one to two hours, intravenous injection was followed by complete immunity in from three to four days; whereas, if the unwarmed material was used, immunity did not appear until fourteen days, and then only after the employment of relatively large amounts. Moreover, when the previously-heated products are introduced into the circulation of the animal, the systemic reaction is of but short duration, but if the unwarmed substance is employed, immunity is manifest only after the appearance of considerable elevation of temperature, which lasts for a long time. In explanation of these differences, they suggest that, in the latter case, the high fever that is seen to occur in the animal may serve to substitute the warming to which the product had not previously been subjected, and which is necessary before the products of the bacteria are in a position to bring about the condition of immunity. They claim that the bacterial products

employed in producing immunity in this case are not, in actuality, the immunity-affording substance, but that they are only the agents that bring about in the tissues of the animals alterations that result in the production of *another body* that protects the animal. In support of this, their argument is that several days are necessary for the production of immunity by the introduction into the animal of the bacterial products; whereas, if the blood-serum of this animal, which is now protected, be introduced into the circulation of another animal, no such delay is seen, but instead, the animal is forthwith protected. In the former case the actual protecting body must first be manufactured by the tissues; whereas, in the second it is already prepared, and is introduced as such into the second animal.

The serum of immunized animals is not only capable of rendering other animals immune, but moreover possesses curative powers when the disease is already in progress. The serum of immunized animals, when injected into the circulation of animals in which this form of infection was in progress, and in which there was a body-temperature of from 40.4° to 41° C., reduced this temperature to normal (37.5° C.) in twelve consecutive experiments during the first twenty-four hours following its employment.

Klemperer and Klemperer explain that the crisis seen in pneumonia in human beings occurs at the moment when the poisonous products, which are manufactured by the bacteria located in the lungs, are present in the circulation in amounts sufficient to call forth in the tissues the reactive change that results in the production of the antidotal substance that has the power of rendering the poisons inert.

At the time of the crisis in pneumonia the bacteria themselves are in no way affected. They remain in the lungs, and can be detected, in full vigor and virulence, in the sputum of patients a long time after the disease is cured. They have lost none of their power of producing poisonous products, and still possess their original pathogenic relations toward susceptible animals. It is only after the crisis that their poisons are neutralized by this antidotal proteid that has been eliminated by the cells of the tissues, and as this occurs the systemic manifestations gradually disappear. Klemperer and Klemperer isolated from the cultures of the diplococcus of pneumonia a proteid body that is the agent concerned in producing the tissue-changes that result in the formation of the protecting substance. They likewise isolated from the serum of immunized animals a proteid that possesses the same powers as the serum itself—of affording immunity and of curing the disease. The poisonous bacterial product they propose to call pneumotoxine; the protecting body, anti-pneumotoxine.

<sup>1</sup> Klemperer und Klemperer: Berliner klin. Wochenschr., 1891, Nos. 34 and 35.

<sup>2</sup> Animals do not, as a rule, present the pneumonic changes seen in human beings. The introduction of the diplococcus of pneumonia into their tissues results, in the case of susceptible animals, in the production of septicemia.



After obtaining these results upon the lower animals they directed their attention to human beings, and found that by the subcutaneous application of the serum of immunized animals to patients suffering from acute fibrinous pneumonia the results were in the main promising. They found that while healthy individuals and those suffering from other forms of disease presented no systemic reaction after the injection of the serum, in six cases of pneumonia in which the serum was employed there was a remarkable fall of temperature and slowing of the pulse within the first twelve hours after it was injected. In four of these cases the temperature fell to normal, but rose again after six hours. In two cases it fell to normal, and remained at that point.

It would appear from the results obtained by these two observers that immunity against this disease, and the processes concerned in its cure, were of a chemical nature, the active poisons of the organisms, the pneumotoxines, being neutralized by the tissue-products, the anti-pneumotoxines.

Results upon animals in general analogous to those of Klemperer and Klemperer have been obtained by Emmerich and Fowitzky.<sup>1</sup>

In the light of these experiments the hypothesis advanced by Buchner, that immunity was to be explained by reactive changes in the integral cells of the body, receives considerable support. Bearing also upon this point, the experiments of Bitter (*loc. cit.*) showed that, in the protective inoculations against anthrax, the vaccines that are employed do not disseminate themselves through the body, as is the case when the virulent organisms are introduced, but remain at the point of inoculation, and from this point, produce, by the absorption of their chemical products, the systemic changes through which the animal is protected against infection by the virulent organisms. The experiments of Emmerich and Mattei<sup>2</sup> upon the disease known as Schweine-rothlauf offer further support to this doctrine.

More significant, perhaps, in this connection are the results of Emmerich and Mattei,<sup>3</sup> and of Powlowsky<sup>4</sup> obtained in their work upon anthrax. Emmerich and Mattei claim to have produced in the tissues of the rabbit, by the subcutaneous and intravenous injection of cultures of the streptococcus of erysipelas, a condition of resistance that enabled the animal to withstand subsequent subcutaneous inoculation with virulent anthrax bacilli. This, they claim,

is not due to any antagonism between the organisms themselves, for in culture-experiments the two organisms grew well together, without any alteration in their pathogenic properties, but rather to the production of a tissue-change by which resistance to the inroads of the virulent bacilli was established. Emmerich and Mattei interpret this "reactive tissue-change" as a power acquired by the integral cells of the body, of eliminating a product that is detrimental to the pathogenic activity of the anthrax bacilli. Powlowsky (*loc. cit.*), who obtained similar results after the introduction into the animal body of cultures of the bacillus prodigiosus, of staphylococcus pyogenes aureus and of the diplococcus of pneumonia, believes them to be due to a more energetic phagocytosis that these cultures of non-pathogenic organisms had induced. They prepared, according to his views, the phagocytes for the more difficult task of rendering inert the disease-producing bacteria that were to be introduced into the tissues subsequently.

This review by no means embraces all the work that has been done upon this important subject, but the investigations that have been cited will serve to indicate the direction in which these studies have been conducted and furnish a conception of the phenomena of infection and immunity as reviewed from the present experimental standpoint.

From these experiments we may conclude:

1. That, of the hypotheses that exist for the explanation of immunity, that which assumes acquired immunity to be due to reactive changes on the part of the tissues has received the greatest support.

2. That immunity is most frequently seen to follow the introduction into the body of the products of growth of bacteria that in some way or other have been modified. This modification may be artificially produced from the products of virulent organisms and then introduced into the tissues of the animal; or the organisms themselves may be so treated that they are no longer virulent, so that when introduced into the body of the animal they eliminate poisons of a much less vigorous nature than is the case when they possess their full virulence.

3. That immunity following the introduction of bacterial products into the tissues is not the result of the permanent presence of these substances *per se* in the tissues, or to a tolerance acquired by the tissues to the poison, but is probably due to the formation in the tissues of another body that acts as an antidote to the poisonous substance.

4. That this protecting proteid that is eliminated by the cells of the tissues need not of necessity be antagonistic to the life of the organisms themselves, but in some cases must be looked upon more as an antidote to their poisonous products.

5. That in the serum of the normal circulating

<sup>1</sup> Emmerich und Fowitzky: Münch. med. Wochenschr., 1891, No. 32.

<sup>2</sup> Emmerich und Mattei: Fortschritte der Medizin, 1888, No. 19.

<sup>3</sup> Ibid., 1887, p. 653.

<sup>4</sup> Powlowsky: Virchow's Arch., Bd. 108, p. 494.

blood of many animals there exists a body that is capable, outside of the body, of rendering inert bacteria that, if introduced into the body of the animal, would prove infective.

6. That, in many instances, infection may be looked upon as a contest between the bacteria and the tissues, carried on on the part of the former by the aid of the poisonous products of their growth, and resisted by the latter through the agency of proteid bodies normally present in their integral cells.

7. That when infection occurs it may be explained either by the excess of vigor of the bacterial products over the antidotal or protective proteids eliminated by the tissues, or to some cause that has interfered with the normal activity and production of these bodies by the tissues.

8. That phagocytosis, though frequently seen, is not essential to the existence of immunity, but is more probably a secondary process; the bacteria being taken up by the leucocytes only after having been rendered inert through the normal germicidal activity of the serum of the blood and other fluids of the body.

## CLINICAL MEMORANDA.

### A CASE OF PUERPERAL ECLAMPSIA.

BY MORRIS B. MILLER, M.D.,

RESIDENT PHYSICIAN OF THE PENNSYLVANIA HOSPITAL,  
PHILADELPHIA, PA.

THE following case of puerperal eclampsia recently treated in the Pennsylvania Hospital during the service of Dr. Morris J. Lewis possesses some interest on account of the typical character of the uremia occurring after childbirth, and also in regard to the treatment instituted, which included the forcible injection of fluids, with the consequent flushing of the system of the poisonous elements retained. This seemed to contribute as much to the favorable result in the case as any other remedy used:

Ella P., a negress, twenty-three years of age, was brought to the hospital July 10th, at 11 A.M., in a semi-conscious condition, due to evident uremic poisoning. The history obtained from her friends and the physician who secured her admission was that she had fallen into labor at full term on the night previously and had been delivered of living twins at 1.40 on the morning of admission; she had seemed in good condition until 6.30 A.M., when she had the first convulsion, followed almost immediately by coma. At 7.30 A.M., between 9 and 10 A.M., and at 11.40 A.M., three subsequent convulsions occurred. She had never before borne children, but had had two miscarriages; evidences of previous kidney disease were wanting, and she is said to have enjoyed good health previously to this attack. Her friends, on close questioning, thought that she had not passed any urine for a considerable period before labor—just how

long they were unable to state—but they were certain that her bowels had not moved for several days previously to her admission.

When admitted her temperature was 98.4°; pulse 140, with high tension; respiration per minute 30, and regular; she was in a semi-comatose condition, occasionally rousing when disturbed, and giving vent to terrific yells, biting at the nurses, and expectorating thick, tenacious, blood-tinged saliva; her feet and legs were moderately edematous, her face slightly swollen, her pupils somewhat dilated, and her whole condition one of deepening uremic hebetude.

The lungs were normal, heart-sounds booming, with marked accentuation of the second sound at both the aortic and pulmonary cartilages. The uterus was well down in the pelvis and strongly contracted; there was no excessive lochial discharge; the perineum had, however, received a tear extending back nearly to the sphincter ani.

As soon as possible she was catheterized, and the contents of the bladder withdrawn, amounting to three drams of dark, smoky urine, which on boiling showed about 50 per cent. of albumin by bulk, and under the microscope presented numerous broad and narrow hyaline and blood casts, with some slightly granular, and blood in considerable quantity.

An enema containing chloral, gr. xx, and sodium bromide, gr. xxx, was immediately ordered, but was not retained, nor was a subsequent one retained that was given shortly afterward. This same dose was administered by the mouth, but the patient could not be made to swallow, so that sedative medication seemed impossible. The median cephalic vein was then opened, the bleeding being continued until the hard, rapid, tense pulse was replaced by a softer, slower one, the amount of blood taken being about nine ounces. At this juncture the use of the nasal tube suggested itself, and a soft-rubber catheter was procured and passed through the nose into the stomach, first attaching it to a small stomach-pump. The chloral and bromide were by this means forced into the stomach, together with about a quart of water. A steam-bath was immediately afterward prepared, and an endeavor was made to provoke sweating; this, however, was not accomplished until pilocarpine, gr.  $\frac{1}{2}$ , was given hypodermatically, which was followed by moderate diaphoresis. The adverse criticisms recently made on the use of pilocarpine in cases of puerperal eclampsia were fully borne in mind, and the lungs were carefully watched for pulmonary hypersecretion, but as this did not occur, and as the drug acted favorably, it was again employed, always, however, in conjunction with the application of external heat.

At 2.40 P.M. the patient had a typical convulsion, lasting about one and a half minutes, commencing with a wild look in the eyes, which were rolled up and toward the left, then rapidly followed by tonic twitching of the hands, face, and legs, in the order named, and finally a clonic convulsion of the whole body. Respiration was in gasps and the lips were covered with bloody froth. Chloroform was used in this and the attacks that followed, and seemed to lessen their severity as well as shorten their duration. Croton oil was placed upon the tongue, and as it was ineffectual, repeated; elaterium was also used, but

the bowels did not move. At 4 P.M. and at 6 P.M. steam-baths with pilocarpine were given with moderate results; at 5.30 P.M. another dose of chloral and bromide was given in the same quantity by the forced injection through the nasal tube, and, as before, followed by water until the stomach was filled. Severe convulsions occurred at 4.54 P.M., 6.03 P.M., and 6.11 P.M., the one preceding the last being especially violent and lasting nearly four minutes. At 9.30 P.M. the woman was restless and seemed on the verge of another convulsion; chloral and bromide with water were repeated, and dry hot-air was used, causing more sweating than the steam-bath. During the night her condition was very serious; she was in a continuous stupor, from which it was impossible to rouse her; her pulse ran between 140 and 160; her temperature was about 103°, and her breathing was Cheyne-Stokes in character. At 3 A.M. the same treatment was repeated, and she responded by sweating profusely.

Throughout the next day, the 11th, the comatose condition continued; the pulse, however, was a little stronger and respiration was more regular. Every fourth hour the patient was given about one and a half pints of either milk or water by forced injection through the tube, to which was added cream-of-tartar water. Elixirium was given during the day, and toward evening she had three large watery stools. Sweating with dry hot-air was again resorted to, the result being satisfactory. Up to twenty-four hours after admission the urine passed amounted to only nine ounces, which contained about 40 per cent. of albumin by bulk, with blood and casts in abundance.

The note of the 12th was as follows: "Last night she had very profuse diuresis and many bowel-movements. The forced milk-and-water treatment was continued. Toward morning she seemed more conscious, and during the day has grown more rational. Had her last dose of milk at 12 noon, and since then has taken fluids naturally. Has had five watery dejections to-day, and has passed during the twenty-four hours ending at 11 A.M. about eighty ounces of urine (estimated). At 8 P.M., temperature 99.8°, pulse 98, respiration 20; is perfectly conscious, but very irritable and in bad temper."

Convalescence was satisfactory; all edema disappeared within two or three days; the anemia, which was at first marked, rapidly improved with iron, and the albumin in the urine gradually diminished, except during an evacuation lasting four days, which was marked by headache and slight nausea, until on her discharge, August 3d, there was only a faint trace. An examination of the urine made August 1st gave the following result: Sp. gr. 1014, feebly acid, clear and limpid, faint trace of albumin; very few epithelial and pale hyaline casts, some slightly granular; no blood.

The result in this case will obviously point to the advantages in cases that cannot or will not swallow of administering by tube medicines and fluids in quantity. The ease of administration by means of a large, soft catheter attached to an ordinary syringe or funnel would place the method, which seems to commend itself by its apparent rationality, within the reach of all practitioners.

I am indebted to Dr. Lewis for his kind permission to publish this report.

# **CASE OF DOUBLE CLUB-FOOT, DOUBLE CLUB-HAND AND MULTIPLE DEFORMITIES.<sup>1</sup>**

REPORTED BY WM. E. WIRT, A.M., M.D., PH.D.,

LECTURER ON ORTHOPEDIC SURGERY IN THE MEDICAL DEPARTMENT OF THE UNIVERSITY OF WOOSTER, CLEVELAND, OHIO; LATE HOUSE-SURGEON, HOSPITAL FOR RUPTURED AND CRIPPLED, NEW YORK CITY.

I SEE by the reports of the transactions of the New York Academy of Medicine, that Dr. Gibney has reported a case similar to mine—one that was under treatment at the Hospital for Ruptured and Crippled, New York City, while I was house-surgeon of that institution.

The case I report is of even a more severe grade of deformity than the one reported by Dr. Gibney.

The child—a boy—was born in August, 1890, and was brought to my clinic, March 17, 1891, being then seven months of age. He presented a condition of double club-foot, double club-hand, imperfect development, and imperfect action of both ankles, knees, hips, shoulders, elbows, and wrists. In the hands there were contractures of all the fingers—so that in this child there was not a perfect-acting joint in either the upper or lower extremities except in the phalanges of the feet. The feet were in extreme equino-varus. The knee-joints and patellæ were rudimentary and the latter displaced externally. The ends of the bones were smaller than they should be and were irregular. The legs were held extended and could only be flexed through an angle of 30 degrees; the latter part of this flexion caused a crackling noise distinctly audible. The ligaments were lax, permitting nearly as much lateral motion as flexion. There was some knock-knee present. The thighs were held flexed and rotated outward. By force they could be flexed to 110 degrees and extended to 165 degrees. Rotation was limited to one-half the normal arc. Abduction was permitted to but a small extent; adduction was somewhat greater. The obstruction to motion in the lower extremities seemed bony and ligamentous and not muscular or tendinous. The right limb was shorter than the left and on the right side the trochanter major was three-fourths of an inch above Nélaton's line. There was evidently a congenital dislocation of the hip on the right side. At the shoulder and elbows the condition was very similar to that at the hips and knees, with the difference that there was more motion permitted in the upper extremities and the obstruction was more of a muscular character and less bony. The pectoral muscles were strongly contracted. There was marked double club-hand, with imperfectly developed wrists. The hands and fingers were flexed with adduction at the wrists. The flexion in the fingers was due to contracture of the palmar fascia.

We have very little to account for this condition of the child. The mother and friends state that during the fourth month of pregnancy she had a very severe fright caused by a disturbance on the street in front of her home during the middle of the night. She also states that the child was much more quiet *in utero* than her other children were. Her relatives are healthy and none are deformed. She has one other child that is perfectly healthy. The presentation at birth was the breech; the

<sup>1</sup> Read at the meeting of the American Orthopedic Association, in Washington, D. C., September, 1891.



labor was tedious and there was suspended animation of the infant. The head was large, unsymmetrical, and had a depression on one side. The child was very much emaciated and seemed in great pain for four months (thought to be in the head by the parents and attending physician), during which time it was very irritable. Even washing the feet or trimming the nails caused it to cry lustily. From the fourth to the seventh month the child picked up very much, but at seven months, though moderately plump, it had a very markedly undeveloped muscular system. It was unable to sit up unsupported, though there was some voluntary motion of the trunk. In the extremities the power seemed limited to a slight motion of the toes.

Recently I visited this patient and found much improvement. The child is able to sit up and endeavors to play, voluntarily moving its lower extremities at the hip, and the upper extremities in slight degree at each joint. At the knees there is a gain of 30 degrees of flexion; at the thighs there is a gain of 10 degrees of extension and 15 degrees of flexion. In the upper extremities there is the same proportionate gain.

The intelligence of the infant, though below par, has improved, and it is now, at thirteen months of age, about as bright as a baby of seven months.

The feet and hands are about in the same condition as on the first examination, the mother in the meantime not permitting any treatment.

The sensitiveness and irritation in the extremities have very much decreased, so that washing and handling the feet seem to cause very little annoyance. From being extremely emaciated at birth the child has grown to be quite plump. The head measures  $18\frac{3}{4}$  inches in circumference, and is narrow across the forehead relatively to the occipital portion, which is broad.

#### FIBRO-MYXOMA OF THE NASO-PHARYNX.

\* BY J. F. BINNIE, M.A., M.B., C.M.,  
SURGEON TO THE EAST SIDE FREE DISPENSARY, KANSAS  
CITY, MO.

WM. M., eleven years of age, of Brunswick, Mo., was brought to me on May 14, 1890, by my friends Dr. Thompson and Dr. Edwards. Dr. Edwards had seen the patient a year previously, and found that there was a tumor in the naso-pharynx, but how long it had been there could not be made out. He removed the growth with forceps, and found it to be irregularly fimbriated in shape and about two inches long. The tumor reappeared immediately and has continued to increase in size, at first being visible from the nostril, but, as it grew, gradually moving back toward the pharynx.

When brought to me the patient was emaciated and very nervous. Respiration and phonation were both impeded. On examination I found a large tumor occupying the pharynx and pushing the soft palate forward and upward. The tumor was smooth and of a pale-red color, and somewhat hard on palpation.

Chloroform having been administered, a Bellocq's canula was introduced through the nose, and by this means a loop of wire was placed in the pharynx, the free extremities of the wire being brought out through the right nostril. The loop was then guided by the finger over the tumor till it grasped the pedicle, and the wire was

then threaded on a snare écraseur (Jarvis's). By this means the pedicle was very slowly divided and the tumor removed through the mouth. During the operation respiration was so much impeded that intubation with a large gum-elastic catheter was practised and removed all difficulties.

The tumor was egg-shaped and measured  $2\frac{1}{2} \times 1\frac{1}{4} \times 1\frac{1}{4}$  inches.

The pedicle was three-quarters of an inch in thickness. The cut surface of the tumor was smooth and tough. It arose from the point where the nasal mucous membrane merges into the post-nasal.

Microscopic examination proved the growth to be a fibro-myxoma.

Since the operation I have not had an opportunity to see the patient, but Dr. Edwards writes me that his health has improved marvellously, and that he has become quite stout and lusty, and has lost his exceeding nervousness.

Twice since this large tumor was removed Dr. Edwards has tried to remove small tumors from the right inferior turbinated bone, but each time has only succeeded in removing parts of them. Now, however, on my advice, he proposes to remove the turbinated bone itself.

I have examined the portions of tumor that Dr. Edwards removed and find that they also are fibro-myxomata.

The literature on this subject is exceedingly scanty. Dr. Bosworth writes that he has only seen *four* cases, but has collected a few others. Sir M. Mackenzie has notes of only *seven* cases, although he states that he has seen two or three others.

The present case is interesting because, so far as I know, no case has been reported in such a young subject. Since writing the foregoing I have, in conjunction with Dr. Hal. Foster, seen another example of this neopathy, in an adult, arising from the upper part of the posterior edge of the nasal septum.

On June 10, 1891, the patient was again brought to me. During the past year he has constantly gained strength, and is now an uncommonly sturdy youth. Since the large tumor was removed there has been recurrence, and parts of tumors have on several occasions been removed by Dr. Edwards with the Jarvis snare.

On examination the right nostril was found to be completely obstructed, and far back in this nostril a grayish mass was seen presenting, which became more prominent during the act of deglutition. From the mouth nothing could be seen on non-instrumental examination.

An attempt to remove the tumor by means of a Jarvis snare having failed, chloroform was administered and the patient's head brought over the end of the table. The finger in the naso-pharynx showed that cavity to be almost filled with a dense, slightly movable mass of uncertain origin. By means of a Volkmann's sharp spoon, introduced through the mouth, guided by the index finger of the left hand, the mass was with considerable difficulty removed.

As the tumor was being removed the origin was found to be about the level of the lower turbinated bone, near the junction of the nose and pharynx. The nasal sep-

tum was markedly deviated posteriorly. On careful examination by the finger no more growths could be discovered. Bleeding was, of course, considerable and plugging was resorted to.

On the tumor being removed, there remained a grayish surface about the size of a nickel. This was the part seen from the nose, and evidently was the point at which Dr. Edwards had removed part of the tumor with the Jarvis snare.

As a whole, the tumor was like a bag of mucous membrane enclosing three tumors each about the size of a marble, the mouth of the bag being the point of attachment to the naso-pharynx. The shape of the growth was very irregular, and its longest diameters measured  $2\frac{1}{4} \times 1\frac{1}{4} \times \frac{3}{4}$  inches.

#### A CASE OF PLEURISY WITH EFFUSION.

BY SAMUEL BELL, M.D.,

PROFESSOR OF PHYSIOLOGY AND DISEASES OF THE CHEST IN MICHIGAN COLLEGE OF MEDICINE OF DETROIT.

ANNIE H., aged twelve years, came under the service of Professor Wyman, at the surgical clinic. After making a brief examination he referred her to the department for diseases of the chest. Upon inspection the following conditions were found: Deformity of the spinal column; lateral curvature, chiefly in the dorsal region; bulging of the ribs on the left side; prominence of the shoulder-blade on the corresponding side; the patient anemic and the respiration hurried. No distinct point of tenderness could be detected by pressure along the vertebral column. In answer to my interrogations the mother said that the child had taken cold some four or five months previously, followed by pain, cough, shortness of breath, and the curve in the back. Her temperature was  $101^{\circ}$ , the pulse 90, the respiration 24. As the mother stated, although the child had been under medical treatment there had been no amelioration in her symptoms or improvement in her condition. Upon a correct diagnosis depends successful treatment, and this case was not an exception to the general law. The diagnosis resolved itself into a differentiation between subacute pleurisy with effusion and lateral curvature of the spinal column. It was evident that the latter had been the diagnosis, and that the girl had been treated accordingly. Submitting the little patient to a careful physical examination the following features in the case were brought out: The normal respiratory murmur over the affected side was almost inaudible and entirely absent over the base of the lung on the left side. No friction-sounds could be heard at this stage of the disease on account of the amount of fluid-accumulation. Upon percussion the normal pulmonary resonance, even in a modified form, could not be elicited. A flat sound was heard over a greater area than is circumscribed by the heart and lungs, and this was exaggerated or modified according to the position of the patient. Vocal fremitus was absent over the affected side. In accordance with the facts, a diagnosis of subacute pleurisy with effusion was made. The marked deformity, especially posteriorly, was very similar to that found in lateral curvature. The chief symptoms were cough, shortness of breath, loss of appetite and flesh, and continual rise in temperature. The

treatment consisted in strapping the chest with long adhesive strips, encircling the chest, in order to keep the side as quiet as possible. This, together with a careful general tonic treatment, brought the little sufferer back to the normal state of health.

It is the large amount of serous effusion which, containing more or less cellular elements, distinguishes subacute from the acute variety of pleurisy. In order to prevent cell-proliferation and a large amount of serous effusion, the affected side should be kept as quiet as possible, thus preventing the distended pleura from frictional irritation. In the first and second stages quiet, if properly carried out, will be found a very important adjunct to internal treatment. I have not had good success with severe antiphlogistic remedies directed toward the removal of the effusion. As in this case, and in a very large percentage of such cases, the patient will be anemic, and assimilation and absorption, which play a very important part in the removal of effusions, will not be up to par. Consequently, in order that the natural absorbents of the system shall carry away the abnormal accumulation, the whole system must be built up with tonics and reconstructive treatment. As in the case in question, a careful selection, appropriate to the peculiar condition and idiosyncrasy, will yield good results.

#### DISLOCATION OF RADIUS BACKWARD; REDUCTION AFTER EIGHT WEEKS.

BY A. H. FRASER, M.D.,

LICENTATE ROYAL COLLEGE OF SURGEONS, EDINBURGH, OF HARPER, KANSAS.

CASES in which a backward dislocation of the radius has been successfully treated after a period of eight weeks has elapsed since the original injury are of sufficient rarity to justify the publication of the following notes:

A. B., a tall, well-grown girl, aged twelve years, was thrown from a pony. She fell on her elbow and complained of great pain. The family physician was sent for, but failed to discover any special injury to the joint; he put on a bandage, keeping the arm extended. At the end of four weeks, there being no improvement, the arm was again examined, and pronounced to be "all right;" but, as there was no movement in the joint, and considerable deformity at the end of eight weeks, the child was brought to Dr. W. G. Muir, of Harper, who asked me to see the case in consultation with him.

On examination it was discovered that the arm was fixedly extended, with the hand in a position midway between pronation and supination, without power to complete either movement. On the inner side of the joint there was a lump of callus, the result of an oblique fracture of the ulna just below the coronoid process, and the head of the radius was dislocated backward and outward. The elbow-joint was quite immovable, the arm being moved entirely from the shoulder.

We decided to attempt reduction. The mother of the child, having consulted some local practitioners, who informed her that it would be useless, or worse, to do anything, was somewhat averse to this course, but the father, on being assured that the arm would, at all events, not be made any worse, consented to our trying.

The girl being placed fully under the influence of chloroform, forcible extension and rotation of the arm outward

was made by me, while Dr. Muir with his thumbs pressed firmly downward and inward on the head of the bone. After considerable difficulty our efforts were rewarded by the head of the bone slipping into its place. A long, straight posterior splint was applied for a week, when she returned for treatment. This consisted in passive movement in the joint, and the application of an electric current to the muscles. At the date of writing, ten days after the beginning of actual treatment, the girl can pronate and supinate her hand perfectly, and flexion has been established to an angle of 45 degrees.

Such a result ought to encourage surgeons to at least attempt reduction of luxations of the elbow, even after two months have elapsed. In this case there is every prospect of getting a most useful arm.

#### THE LOOFAH AS AN ASEPTIC SCRUBBING-BRUSH.

BY JOHN B. ROBERTS, M.D.,

PROFESSOR OF SURGERY IN THE WOMAN'S MEDICAL COLLEGE OF PHILADELPHIA.

THE desire of surgeons to obtain a clean brush for scrubbing the skin before operations, in order to remove accumulations of epithelium and bacteria, makes a cheap article a desideratum.

I think that small pieces of the Egyptian loofah, which is found in all drug-stores for use in the bath-room, meet the indications admirably. For a number of years I have used pieces of this material for cleansing the skin before operations. A single loofah costs about ten cents and is large enough to be cut into ten or a dozen pieces. After use these pieces may be thrown away, as the cost is rather less than a cent each.

This vegetable scrubbing-brush, as it may be called, is, of course, of no value in cleansing a surgeon's nails, because it will not enter the subungual spaces as will the bristles of a brush.

I usually carry in my operating-case three or four pieces of loofah for scrubbing patients. It comes compressed like sponges, and a piece cut off before the loofah has been soaked in fluid can be carried in a small compass in an operating-case. For hospital use pieces of loofah can be kept soaking in sublimate solution until used and then thrown away, or soaked again, as the more expensive nail-brushes are treated.

### MEDICAL PROGRESS.

**Myxedematoid Condition of One Half of the Body.**—THOMSON (*Edinburgh Medical Journal*, September, 1891) reports the case of an infant, nineteen months old, presenting a tumid condition of the right side of the body that was noticed shortly after birth. The parents were not related, nor was there a family history of goiter or of idiocy. A maternal granduncle had been insane. The mother was neurotic and presented a cardiac lesion. A younger child, four months old, was perfectly healthy and well-formed. The little patient was born naturally at term, after a tedious labor. Within a week of birth the right side of the face and the right extremities were observed to be swollen. There was little or no subsequent increase of the swelling. There were no changes in the bones; the enlargement appeared to depend upon

a thickening of the subcutaneous tissues. The hair was soft and abundant. The right ear was larger than the left and presented a translucent, waxy appearance. The neck was short; the cervical fat contained several enlarged glands. The presence of the thyroid gland could not be detected. The posterior triangle of the neck on each side contained a soft, projecting mass of fat about as large as a walnut; a similar and larger mass was situated in front of the left axilla. The intelligence was enfeebled. The child died of pneumonia, but an autopsy was not permitted.

**Boric Acid in the Treatment of Furunculosis.**—ALISON (*La Semaine Médicale*, August 19, 1891) has recommended the administration of boric acid, internally and externally, in the treatment of furunculosis. From twelve to fifteen grains are given in two tablets daily, for from a week to two weeks. In addition, four or five times a day, gentle friction of the furuncles and the surrounding areas is made with a warm 4 per cent. solution of boric acid. In the intervals, the parts are covered with compresses saturated with the same solution. The treatment is said to abort incipient furuncles, to cause the rapid disappearance of matured furuncles, and to check the development of a new eruption. In cases of anthrax, the treatment is said to be followed by amelioration of the general and local symptoms; pain, peripheral redness, and induration diminish; the mass softens, and the pus is afforded exit; the fever declines, the agitation and the insomnia subside, and in the majority of cases recovery results without surgical interference.

**The Determination of Sex.**—WILSON (*Lancet*, September 26, 1891) proposes a theory that makes sex mainly dependent upon the nutritive perfection of the ovum at the time of impregnation. He holds menstruation and ovulation as practically a single process. When impregnation occurs in anticipation of menstruation, the product of conception is likely to be a male; when impregnation takes place subsequently to menstruation, the product of conception is likely to be a female—in other words, the earlier after ovulation that impregnation takes place, the greater the probability of the product of conception being a male, and, conversely, the later that impregnation follows ovulation, the greater the probability of the product of conception being a female.

**The Detection of Tubercle Bacilli in Sputum.**—DAHMEN (*Münchener med. Wochenschr.*, September 22, 1891) recommends heating for fifteen minutes in a flask placed in a water-bath or steam-bath sputum suspected of containing tubercle bacilli. The albumin is thus coagulated. On cooling, the solid particles and bacteria sink to the bottom of the vessel. The supernatant fluid is decanted and the cheesy sediment is triturated in an agate mortar. From this material, cover-glass preparations are made and stained in the usual way. If the quantity of sputum is inconveniently large, water may be added and sedimentation awaited. It has been found that practically only the sediment contains the bacilli when present. The supernatant fluid may after a brief interval be poured off and the lower layer heated for fifteen minutes in the manner described.



# THE MEDICAL NEWS.

A WEEKLY JOURNAL  
OF MEDICAL SCIENCE.

COMMUNICATIONS are invited from all parts of the world. Original articles contributed exclusively to THE MEDICAL NEWS will upon publication be liberally paid for, or 250 reprints will be furnished instead of payment. When necessary to elucidate the text, illustrations will be provided without cost to the author.

Address the Editor: GEO. M. GOULD, M.D.,  
1004 WALNUT STREET,  
PHILADELPHIA.

*Subscription Price, including Postage in North America.*

PER ANNUM, IN ADVANCE . . . . . \$4.00.  
SINGLE COPIES . . . . . 10 CENTS.

Subscriptions may begin at any date. The safest mode of remittance is by bank check or postal money order, drawn to the order of the undersigned. When neither is accessible, remittances may be made, at the risk of the publishers, by forwarding in registered letters.

Address, LEA BROTHERS & CO.,  
Nos. 706 & 708 Sansom Street,  
PHILADELPHIA.

SATURDAY, NOVEMBER 7, 1891.

## THE NECESSITY OF MEAT-INSPECTION.

THE inspection by employes of the National Government of cattle intended for exportation is a commercial regulation adopted to facilitate this branch of the export trade. It is founded upon the restrictions imposed by foreign governments in the interests of the public health. The sanitary supervision of the home supply is left entirely in the hands of the municipality. It frequently happens, as recently shown in this city, that cattle condemned by government officials as unfit for exportation, on account of a diseased or unsound condition, are slaughtered and their flesh converted into sausages or exposed for sale upon the market. The government inspection service is necessarily restricted. It has no authority to dispose of the rejected cattle or to prevent them from being slaughtered for the home market. Unless the local authorities confer such authority, even the limited advantage that might thus be gained is lost to the public. But nothing short of a rigid local inspection of cattle and of the meat before it is exposed for sale will guarantee protection to the public against a practice quite common in all our cities.

We venture to assert that no city in the United States has a complete and faultless system of inspection of the flesh of animals intended for human

consumption. In Philadelphia, such a service does not exist, even in name. The Board of Health has repeatedly made efforts to secure the means necessary to carry into effect a law upon the statute books relative to the sale of diseased or unsound meat, but without success.

The public alarm recently excited by the exposure of the practice of slaughtering for home use cattle rejected by government inspectors as unfit for exportation, has had the effect of putting in motion vigorous measures to detect and punish the offenders. But the chief interest centers in the fact, so pointedly illustrated, that without a system of sanitary inspection of the food-supplies, the public are not only defrauded, but their health and lives are placed in jeopardy. It rarely happens that the purchaser can decide from the appearance of meat whether the animal from which it was taken was healthy or diseased; hence the right to demand protection from the local government.

Fresh interest is imparted to this subject by our more precise knowledge of the transmission of tuberculosis through the milk and flesh of diseased animals. We know that tuberculosis is very common among cattle, and we know further that cattle suffering from this disease are slaughtered without hindrance. It is true that, if thorough, the process of cooking will protect against infection, but the chances of this result cannot be weighed against the certainty of protection afforded by rigid inspection.

Animals should be examined immediately before being slaughtered, and again before the meat is exposed for sale. In large commercial communities, where there are innumerable private slaughter-houses, the difficulties of inspection are very great. But in great measure they could be overcome by the concentration of the business of slaughtering in public slaughter-houses or abattoirs. It is the custom in Berlin to require all fresh meat not slaughtered in the public abattoir to be subjected to official inspection before its sale is permitted. To carry out this object, a number of inspection-stations have been provided, conveniently located, and so managed as to cause no hindrance to business. The staff of inspectors consists of one hundred and sixteen persons, and these are supplemented on two days in the week by from forty to fifty meat-inspectors and veterinary surgeons. To these stations the meat must be brought for examination, both macroscopical and microscopical, and,

after such examination, it is stamped according to its condition.

An examination of the results of one year's inspection shows that very much of the meat rejected and handed over to the police contained tubercle. Trichinæ and measles were present in pork eighteen and seventy-eight times respectively, while in more than one thousand calves the meat was too watery to be fit for food. Echinococci and thread-worms were found in some of the meat, and much that was brought to the stations was detained because it had become decomposed. We fear that an inspection as rigidly conducted in any of our cities would reveal results that the public have not been accustomed to suspect.

It is a reflection upon the wisdom of our legislators that they neglect an important duty until the popular voice clamors for relief. The recent *exposé* has furnished sufficient reason why an important means of conserving the public health should not be longer neglected. It is imperative that the Board of Health should renew its efforts to have a system of food-inspection at once inaugurated. A thorough system, conducted by an adequate force of trained officers, such as that now in operation in Berlin, is what is needed in every American city. The commission of a few inexperienced inspectors, unassisted by experts accustomed to the appearances of disease and the use of instruments of precision, would be an imposition upon the intelligence and confidence of the people. Fortunately, the University of Pennsylvania has inaugurated a course of instruction intended to prepare students for this special branch of investigation, so that the time is auspicious for satisfactorily meeting a much-needed public want.

#### THE ACARUS SACCHARI.

The sugar insect is of interest to the physician, as it may possibly be that the large numbers found in raw sugar would make it injurious to the health of the consumer, and moreover there is a skin disease produced by handling unrefined sugar. *Acarus sacchari* is an insect belonging to the order Arachnida (spiders). This order is further divided into the families Pedipalpi (harvest-men or daddy-longlegs, scorpions, etc.) and Acarina (mites, ticks, etc.). These insects are particularly interesting to the medical man and veterinarian, as some of them are poisonous to man and the lower animals, and some are parasitic. DR. HASSEL was the first to call

attention to the general occurrence of *Acarus sacchari* in raw sugar sold in London. According to PROF. CAMERON (see *Journ. of the Franklin Institute* for November, 1868), they were found in a living state in no fewer than sixty-nine out of seventy-two samples. He did not detect them in a single specimen of refined sugar. In an inferior sample of raw sugar he reports finding 500 mites in 10 grains of sugar, or 100,000 to the pound.

The *Acarus* may be avoided by using only refined sugar; but, even if they were eaten, it is questionable whether they would do any harm, and they might be nourishing, but no one would care to eat disgusting-looking insects by the thousand. The disease known as grocer's itch is undoubtedly due to the presence of this mite, which works its way under the skin, and produces symptoms identical with those produced by the common itch-mite, *Sarcoptes scabiei*, and the remedies would be the same for both. It would aid the physician in diagnosis to know that grocers and handlers of sugar are liable to such a disease. Raw sugar is probably not sold in large cities at the present day, so that psora, scabies, or acariasis is a rare disease among grocers, but it is probably to be found to some extent among refiners and handlers of raw sugars. These mites multiply very rapidly, and GERLACH has computed that a single female would produce 1,500,000 progeny in three months. Thus, in treatment it is necessary to find a means of riddance of that last female. A microscopic examination of minute particles of scab shows them to be alive with the old and young *Acari*. The treatment is set forth in works on skin diseases, and various parasitocides are used, such as mercuric chloride, sulphur, etc.

Three species of *Acari* are found on sheep, and the "scab" is one of the most dreaded diseases of this domestic animal. Other species are found parasitic on the cat, dog, and swine. Horses, cattle, and birds are also infested, and quite a number of genera and species of these insects are known. The "ticks" *Ixodidae* are a well-known plague to the traveller in the tropics, and are not uncommon in this locality. A case is reported of a child playing among the leaves in a wood near Springville, Pa., who, on her return home, complained of pain in her arm. No attention was paid to it until the next day, when a raised tumor was noticed, a small portion protruding through the skin, apparently like a splinter of wood. The child was taken to a

physician, who, after considerable pain to the child and labor to himself, extracted a species of *Ixiodos* nearly one-fourth of an inch long, of an oval form and brown mahogany color, with a metallic spot, like silver bronze, centrally situated on the dorsal region.

#### UNITED STATES MEDICAL PRACTITIONERS' PROTECTIVE ALLIANCE.

THE report of the proceedings of the first annual meeting of the United States Medical Practitioners' Protective Alliance, held at Baltimore, June 11, 1891, just published, contains the Constitution and By-laws, and the addresses of the Founder, DR. J. H. DEWOLF, of the President, DR. W. H. CRIM, and of DR. W. V. WILSON. The objects of the Association, as stated by the Constitution, are "to maintain organized coöperation among the practising physicians who are legally qualified to practise in their respective States and in good standing in the profession, for the purpose of protecting medical practitioners from the abuse of dispensaries, that treat many who are well able to pay; from the unjust competition caused by short-term, quick-graduating, and inferior medical colleges; to endeavor to promote the passage of just and equitable laws regulating the practice of medicine in all the States, so that the license to practise issued by any one State shall be valid in any other State; and to devise means to enhance our financial condition (and thereby our usefulness) in every honorable way, and to derive the incalculable benefits that only can be obtained by combination and unity of action."

With these principles, and especially as further amplified and exemplified by the different addresses made, every honorable physician will have the heartiest sympathy. It seems strange that such an organization has not long been formed and in working order. Centralization and coöperation are the watchwords of the day in all fields of work. But in the medical business (for business the practice of medicine is in part, and in one clear aspect) there is no united action to correct the present abuse and forefend the coming evil. It has become such a part of the routine of public thought and personal habit to consider the physician as an almsgiver of his time and talents, that there is some shock to the mind even in the thought that his life should be in part governed by the same business customs as are altogether dominant in other walks

of life. The terrible evil of hospital-abuse has grown and grown, by *laissez-faire*, by sinful sentimentalism, and by the kindness and scientific enthusiasm of the physician, to such frightful proportions that it is only by the combination of self-respecting medical men that head against it may be hoped for.

Every physician should hasten to become a member of this excellently planned organization. The Corresponding Secretary is DR. J. F. DAVISON, of Glendola, N. J., who, upon application, will doubtless send copies of the *Transactions* for 1891. DR. WILSON'S address upon "The Abuse of Medical Charities" should be read by all.

#### POISONING BY ANTIKAMNIA.

Nor long ago we spoke of the tendency to the debauching of therapeutics by manufacturers; and especially of the utterly reckless use of a certain well-advertised mixture of coal-tar products, of unknown composition, and very probably dangerous. The *New York Medical Journal* of October 17th editorially comments on a fatal case of "antikamnia" poisoning reported editorially in the *American Practitioner and News* of September 12th.

For a slight headache the victim had dosed herself with twenty-four grains of "antikamnia," supposed to represent eighteen grains of acetanilide, the rest of the baleful nostrum being supposed to be sodium bicarbonate. Acute delirium, unconsciousness, and fatal coma made up the train of events. Death occurred in about ten hours from the time of ingestion of the poison. Post-mortem examination failed to reveal other cause for the death than the action of the drug or drugs.

Our contemporaries justly remark that "antikamnia" should be listed among poisonous drugs not to be non-professionally and promiscuously prescribed, and also forcibly point out that the use of powerful agents of undeclared composition is in every instance likely to lead to unfortunate, if not always fatal results. The Philadelphia County Medical Society has a provision debarring from membership those who prescribe nostrums. "Antikamnia" certainly falls within this wise prohibition.

The seducer is always culpable. The seduced may or may not be justly liable to condemnation, according as she may or may not have age, knowledge, and experience of the world. The manufacturer who, for purposes of gain, lures members of the



medical profession to the use of his secret and worthless, if not dangerous, products must be despised by every right-thinking person. But can the physician who yields to the unholy solicitation plead either tender years or ignorant innocence in excuse of his miserable fall?

It is time to speak plainly and to act courageously, or the corruption must extend until the prostitution of our art is complete and irremediable.

## SOCIETY PROCEEDINGS.

### THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

*First Annual Meeting, held at Philadelphia, September 24, 25, and 26, 1891.*

(Continued from p. 544.)

#### THIRD DAY—SEPTEMBER 26TH.

DR. W. F. ROBINSON, of Albany, N. Y., read a paper on "Electricity in the Treatment of Rheumatism." Therapeutically he divided cases of rheumatism into two classes: 1. Those in which only one or two joints are affected, which he always treats by means of galvanism. 2. Those in which the rheumatic poison is more extended in its action, involving joints, muscles, fascia, etc., for which he employs static electricity. The electrodes used should be large—the larger the better—and carefully made. If covered with sponge, this should be soft and free from gritty particles. In order to increase the conductivity of the skin, the sponges should be saturated with a hot solution of bicarbonate of soda. The caustic action and the electrolytic action of the electrical current are to be avoided in the treatment of rheumatism. The action of vital stimulation is to be sought; to obtain it the procedures of interruption and voltaic alternation must be adopted. Voltaic alternation is a still stronger stimulation than interruption, but it must be used with caution, for with strong currents the pain and irritation are very great. Joint-rheumatism, pure and simple, is almost powerless to withstand the direct application of the galvanic current. When the disease is more diffused and involves various tissues and organs in different parts of the body, static electricity is indicated. The general charge is rarely used alone, and static electricity is usually given by means of special electrodes in the form of sparks. The applications may be made on alternate days. The usual length of the treatment is ten minutes, for about five of which sparks are drawn, the patient during the remaining five minutes simply sitting quietly upon the platform and taking the general charge.

Dr. Robinson expressed the belief that electricity has a twofold action that meets all the indications of rheumatism: a specific action against the morbid process and a general tonic action that tends to build up the system depressed as a result of the disease.

DR. GOELET stated that the sedative effect of galvanism could best be had by currents of short duration. To make a clay electrode that can be applied agreeably to

the patient, Dr. Goelet makes the clay of the consistency of putty, and so maintains it by keeping it moist. A flat pad is made by rolling it on a board as if it were dough; it is gotten into shape, and, after having a metallic plate placed on the back, is covered with a layer of absorbent cotton; then sewed up in a gauze cover. On the back is placed rubber cloth, just as in sponge-covered hand electrodes. To avoid the discomfort of a cold application the electrode may be kept on a warming-pan which consists of a flat zinc jug filled with hot water.

DR. WALLING stated that he had observed pain in the cardiac region from positive insulation, while negative insulation occasioned no discomfort. The positive causes constriction of the capillaries, thus acting on the circulation, while negative insulation does not.

PROF. EDWIN J. HOUSTON, on invitation, said that heretofore advances in the line of electro-therapeutics have been somewhat hampered by the natural tendency to regard the body as a receptive device rather than as an electric source, as it must be regarded. Chemical processes are constantly going on in it that must result in a difference of potential between the different organs. If this is true, then there must necessarily exist variations in regard to the differences in potential in the organism. Secondly, the human body necessarily displays differences of temperature; although the temperature of the body is about 100° F., yet there are differences in the internal organs and in the generation of true thermoelectricity. These differences of temperature must also result in differences of potential, which the body normally possesses, and necessarily in febrile disturbances there would be abnormal electrical conditions to which in the future the electro-therapist might do well to direct his observation. Thirdly, the body presents abnormal and normal currents. There are demarcation currents, currents produced by injuries to nerves and chemical decomposition, a result of the tendency to a restoration of the normal condition. If the human body is to be regarded as an electrical source, the electrical diagnostician, as well as the electro-therapist, has to ascertain the following conditions of the body:

First. The condition of the human body as regards differences of potentialism.

Second. The changes of muscles following the conditions of rest and activity.

Third. The resistances of the different parts of the body.

In all these directions the most promising line of research must be in modifying and ascertaining the true resistance of the different parts of the body; if possible, to eliminate that very variable element, the resistance of the skin. When the resistance of any organ or part of an organ, or the whole body or a part of the body, and differences of potential in volts are known, proper calculations can be made.

Under what conditions may the resistance of the body be expected to vary? First, the condition of the skin as to dryness or moisture, and then the diseases of the skin; second, the temperature; and, third, whether the resistance of the body would be the same from the head to the feet as from the feet to the head; if the human body is a source and not a receptive of electricity, the body must have a resistance; and fourth and most important, the normal and abnormal condition of the body as

altering its resistance. It is well known that diseases (at least some of them) change the resistance of the body very materially.

DR. M. A. CLEAVES, of New York, read a paper on "The Use of the Galvanic Current in Articular Inflammatory Exudations," in which she reported a case of subacute articular rheumatism of the right wrist and hand in a woman who had already suffered several attacks of inflammatory rheumatism. The hand was swollen, infiltrated, and edematous. There was a decided increase of local temperature, much pain, and extensive capillary congestion. The carpal and metacarpophalangeal articulations were in a state of extension; muscular power and sensation were almost lost.

Stable applications of galvanism, 10 milliamperes for fifteen minutes, with the anode at the sternum and the kathode successively to the dorsal aspect of the wrist and metacarpophalangeal articulations, were soon followed by relief from pain, diminution of heat, and increased mobility. The treatment was given daily for one week, then at intervals of two or three days. In all there were thirteen sittings.

Subsequently five applications of the faradic current were made, the secondary kathode at the sternum, the anode to the motor points and labile to arm and hand, 35 cyl., for from five to ten minutes, with the result of increasing muscular power. The ultimate improvement was decided and satisfactory.

In another case there were partial extension, pain, and loss of mobility of the right wrist and hand, as a sequel of cellulitis and blood-infection following the bite of a mosquito. The interrupted galvanic current was applied by means of a gauze-wire electrode, 3 by 4 inches, covered with absorbent cotton, placed over the spinal region of the brachial plexus and attached to the anode, the kathode being connected with a cotton-covered gauze wire, 1½ by 8 inches, placed successively over the carpal, metacarpophalangeal, and phalangeal articulations. The current-strength was as great as could be borne. The length of the sitting was from fifteen to twenty-five minutes. There was soon increase in mobility of the affected joints, partial restoration of function, and relief from pain.

There were eleven sittings. The final result was not all that could have been desired, but was a decided improvement upon the preëxisting condition. The question naturally arises, Why should we wait until the advanced stages, attended as they are with marked thickening of the articular and peri-articular tissues, contractions of muscles, exudative matter about sheaths of tendons, greater or less impairment of movement, and deformity, in which electricity must be our chief resource, when better results can be obtained in a subacute condition, before exudative matter has become so fully organized.

There is no danger of developing more acute inflammation. On the other hand, it is necessary to excite a more active circulation in the part, with a view of removing the congested state of the capillaries and venules, so favorable to the development of fibroid growths.

Massage is a means toward the same end, but while it quickens and equalizes the circulation, it does not possess the powers of galvanism to produce chemical changes.

In adopting a definite plan of treatment, Dr. Cleaves

was governed by the hypothesis that "living means nutrition, nutrition chemical action, and chemical action under proper conditions means electric current." These conditions are (a) a closed circuit combined with (b) any two different tissues, and (c) one acted upon, the other not.

Animal currents are proved to exist. The acted-upon tissue is an "electro-motive source." It corresponds to the zinc of a primary battery. The electrolyte is the fluid conveying the food to the cells of the acted-upon tissues.

The acted-upon tissue is always *electro-positive* to some other tissue acted upon. This hypothesis holds true of both normal and morbid nutritional processes. As regards such processes, it compels us to base our treatment upon the broad generalization that *every such process is an "electro-positive focus."*

Proliferation is an excessive chemico-nutrition, which the positive pole makes more excessive, the negative pole less excessive—that is, counteracts.

In atrophy there is a deficient chemico-nutrition, which the positive pole stimulates and restores. The negative pole, on the other hand, makes more deficient or destroys. The results, united with much that has been done heretofore, are confirmatory of the hypothesis upon which treatment was based.

In the treatment of disease, results are, after all, the main thing, even if the relation between cause and effect in the use of remedies cannot always be explained; once a scientific basis for polar action is established, much confusion will be done away with, and a decided step will have been taken toward the establishment of a rational electro-therapy.

DR. VON RAITZ, of New York, read a paper on "Electricity in Ankylosis," in which he said that false ankylosis, even with some osseous union, yields to the constant current, with the assistance of massage and passive motion, provided the treatment is carried on earnestly and intelligently.

As the synovial membrane secretes an alkaline lubricating fluid, the functions of nature are to be stimulated by the application of the negative pole. Consequently the affected joint must be snugly enclosed in an electrode connected with the negative pole. Another large electrode may be placed over any indifferent part, and connected with the positive pole. With large electrodes, powerful currents can be used without causing pain or inflammation. For the larger joints, 100, even 120 milliamperes, in half-hour sittings, three times per week, are generally sufficient. Much will depend upon massage, to be applied before the current, upon passive motion, upon constitutional treatment, and upon general hygienic conditions.

DR. CHARLES G. STOCKTON, of Buffalo, read a paper on "The Use of the Gastric Electrode in Diminished Peristalsis."

The instrument employed consists of an ordinary stomach-tube, twenty-eight inches long, with two openings near the distal extremity. At the proximal extremity it is fitted with a hollow steel coupling, which, attached to three feet of the rubber tubing, makes a continuous siphon about five feet in length. With this, the stomach is emptied, and without removing the instrument from the stomach, the tube is disconnected

at the coupling, and a spiral wire, also twenty-eight inches long, is introduced into the tube and the coupling closed by a polished steel plug at the proximal extremity, a sponge electrode being applied to the back or abdomen. In this way the current is conveyed to the stomach admirably, and the electrode does not come in contact with the gastric mucous membrane, save at the fenestra on either side of the tube.

In the treatment of cases of gastric derangement it is best to restrict the diet to those substances that, upon examination of the stomach-contents, are found to be most readily digested. The current should be applied after lavage has been practised, and the faradic current is that which is usually most satisfactory, and which must be applied in sufficient strength to produce, not merely contraction of the abdominal muscles, but movements of the stomach itself.

The sittings should continue for from five to fifteen minutes, usually beginning with five-minute sittings and increasing the duration until the limit of endurance is reached, as shown by an excessive secretion of mucus, a disturbance of digestion, or a feeling of lassitude or pain on the part of the patient.

Having reached this, the proper dosage can readily be estimated. The treatment must, in some instances, be continued for a prolonged time; in other cases, relief follows a few applications.

Dr. Stockton related that he had obtained greater benefit from the application of the continuous current, with occasional interruptions, than from the application of the faradic current.

Twenty-one of forty cases treated in the manner outlined showed greater or less dilatation, as demonstrated by accurate measurement. Of this number, twelve presented dilatation of an extreme degree. Some are still under treatment, but five have been discharged as cured; all have been greatly benefited and a number have improved to such a degree that absorption takes place properly and the stomach is emptied quite uniformly five or six hours after an ordinary meal.

Cases of marked gastric catarrh do best with the continuous current, the anode applied within, the kathode on the back, from eight to fifteen milliamperes being generally employed.

With the current occasionally interrupted dilatation may be relieved, and, not infrequently, the catarrh also improved. In instances of atrophy of the mucous membrane, either current may be employed. The continuous current is useful here because it is more potent in stimulating the secretion of hydrochloric acid than the faradic. Occasionally an excess of hydrochloric acid interferes with the electrical treatment. This, however, is unusual and generally but temporary. As a rule, in ordinary instances the applications should be made at bedtime and the stomach left empty and at rest during the night. This plan, however, will prove impracticable when there is great excess of hydrochloric acid, for this so disturbs the empty stomach that the patient not infrequently loses sleep or awakens in the morning feeling miserably.

In nearly every case of weakened motility, electricity by direct application is of the utmost importance. The exceptional cases are those associated with malignant disease, a few rare cases associated with gastric ulcer,

and some instances of general neurasthenia, in which electricity, no matter how or where applied, is resented by the patient.

DR. LAWRENCE WOLFF, of Philadelphia, read a paper on "Electricity in Diseases of the Stomach." He maintained that the application of galvanism with a view of exciting increased glandular secretion has been decidedly overrated. At no time had he been able, by chemical means, to detect an increase of hydrochloric acid in the gastric juice after the external application of the galvanic current. As internal galvanization, with a view of improving the digestive powers, could only be practised when the stomach was partially filled with water, its value, if it possessed any, would not be available. Yet Dr. Wolff had found the galvanic current useful and of the greatest value in dilating traumatic strictures of the esophagus. He reported an illustrative case in which by the daily employment of metallic bougies in conjunction with galvanic currents of from five to ten milliamperes a cicatricial stricture of small caliber was satisfactorily dilated.

The electrode employed consisted of a soft copper wire, at the lower end of which was a thread for screwing on the olive-shaped bulbs, while at the other end was a clamp for the reception of the wire, which was insulated by being covered with soft rubber-tubing. A large flat electrode was applied to the epigastrium and the sound introduced into the esophagus as far as the stricture, before the connection was made; the current was then gradually permitted to pass and increased until a perceptible sensation at the situation of the external electrode was experienced by the patient. The current was again withdrawn before the removal of the sound.

Dr. Wolff stated that he had also found faradic stimulation of the muscular fibers of the stomach serviceable in atonic ectasis. Before the principal meal of the day the stomach is washed out and the patient is requested to drink about two glasses of water; the tube containing the electrode is then swallowed; the current is then turned on, first gradually, and until peristaltic contraction is apparent to the hands applied to the paretics or to the eyes. The external electrode is usually a large and broad sponge, and is generally applied to the epigastric region; the internal electrode must be immersed in the water contained in the stomach.

Dr. Wolff employs an electrode constituted of a small stomach-tube with two fenestra; through the tube passes a small insulated copper wire, which projects from one of the fenestra; this extremity is denuded of its insulation for about two or three inches, and is twisted into a small spiral, which is slipped through the fenestrum back into the tube so that it cannot come in contact with the stomach.

DR. HORATIO R. BIGELOW, of Philadelphia, read a paper on "Alternative Currents," which he stated was a review of two ingenious and scholarly papers by Mons. D'Arsonval.

DR. J. H. KELLOGG, of Battle Creek, Mich., presented two new electrodes, one of which is flexible, slightly adhesive, and to be used dry. It is made by dissolving twenty ounces of the best gelatin in ten ounces of boiling water and adding ten ounces of glycerin and two drams of sodium chloride. The liquid is heated and



ten ounces of finely pulverized gas-carbon (graphite) added and thoroughly mixed.

To make an electrode a thin layer of the mixture is poured into a shallow tin pan of the size desired for the electrode, the inner surface of which is besmeared with vaselin. Upon this layer is placed a piece of sheet lint of sufficient size to allow the edges to be turned up about one-half inch around the sides of the pan. Upon this is poured more of the mixture, sufficient to saturate and cover the lint; another piece of lint is applied, and the process is repeated until a suitable electrode is cast. Two layers are usually sufficient. A piece of brass-wire cloth, to one corner of which a binding-post has been attached, is next applied, and over this more of the mixture, and then another piece of lint. The wire cloth and the last layer of lint may be a trifle smaller than the electrode is desired to be. Lastly, the upturned edges of the first layer of lint are folded over the back of the electrode, and a sufficient quantity of the mixture applied to hold them in place. When the electrode is cold and sufficiently hardened it is carefully removed from the mould. If the surface of the electrode is not perfectly smooth, or becomes roughened by use, it may be polished with a hot spatula; if the electrode becomes cracked, or its surface very irregular, it may easily be repaired by applying a little of the hot gelatin-mixture and smoothing with a spatula. This electrode is light, clean, adhesive, a good conductor of electricity, and durable.

The second electrode consists of a metallic vacuum-cup, to which a binding-post is attached, a moist sponge being placed in the cup. In practice the air is exhausted from the cup, causing it to adhere firmly in position, at the same time bringing the tissues in close contact with the sponge.

DR. THOMAS W. POOLE read a paper entitled "Some Suggestions as to the Mode of Action of the Galvanic Current in Gynecological Practice," in which he ascribed to electricity, in gynecological practice, a paralyzant action upon the motor nerves of involuntary muscles, as a result of which contraction of the arteries takes place. A moderate effect, quickening the blood-stream, accounts for the beneficial effects occasioned, while an excessive outflow of blood into the veins causes increased pain, tumefaction, and an aggravation of all the symptoms.

He held that the effects produced by the electric current upon protoplasm, upon the blood-corpuscles, upon the heart of frogs in arresting its pulsations, upon the muscles in inducing the earlier onset of rigor mortis, are all what might be expected from an agent inimical to nervous activity.

DR. HENRY MCCLURE, of Norfolk, England, presented a paper entitled "Electrical Contact-force," in which he considered the changes taking place and the forces generated at the junction of dissimilar metals or other substances.

He also elaborated Rust's theory of thermo-electricity, which holds that the electro-motive force is proportional to the rate of speed at which heat passes the two junctions.

Dr. McClure considers true contact-force at the junction of two dissimilar metals or substances to be of the nature of a static strain, heat in the thermo-couple being the means of breaking down such a strain and converting static into kinetic electricity. Whenever a static strain is broken down a current is produced. True con-

tact-force may be seen in insulators as well as in conductors. The striking effects of frictional electricity are due to the same cause—contact of dissimilar substances—and by their contact electricity becomes transferred from one to the other, the violence of friction being mostly necessary to aid the transfer, so that one becomes positive and the other negative. When such a strain is broken down, as in disruptive discharge, a current is produced having electrolytic effects. In good conductors such contact-forces are feeble; electricity seems to slip through the fingers of a metal, as it were, and the driving force that it can exert is weak, while an insulator gets a good grip and thrusts it along with violence. The metals do not all grip electricity alike. Iron is a metal the atoms of which grip positive electricity better than negative electricity; a positive current gets propelled in iron from hot to cold; copper, on the other hand, acts similarly on negative electricity.

DR. FOVEAU DE COURMELLES, of Paris, presented a memorial upon "Medicamental Electrolysis," in which he described the method and the conditions in which he made electrical applications by means of decomposable medicaments. For tumors, synovial cysts, glands, wens, stone, in fact in all abnormal conditions of local hypertrophy, the continuous current was employed in conjunction with medicinal agents, such as the iodides, the salts of lithium, the bicarbonate of sodium. The action is facilitated by the application to the skin of a kind of cupping-glass.

The pain of neuralgia, rheumatism, hepatic and renal colic, can be made to disappear by the employment of the continuous descending current in conjunction with such medicaments as opium, aconitine, and quinine.

Anesthesia and muscular atrophy may be improved by continuous ascending currents with such adjuvants as strychnine and phosphate of lime.

Paralysis, disorders of the nervous system, abnormal functions of various kinds are remedied by interrupted currents, with the introduction into the organism of tonics or excitants, according to the necessities of the case. Baths of static electricity, with medicamental absorption, and descending electrical shower-baths are useful adjuvants. Good may be expected to follow the application of the same principle in the treatment of vesical calculus.

Dr. de Courmelles reported a case of articular rheumatism, one of fibroma of the uterus, one of enlarged prostate, two of gonorrhea, and one of hemiplegia in which satisfactory results were obtained by the employment of the method indicated.

DR. EPHRAIM CUTTER, of New York, presented a communication on "The Galvano-cautery: Its Use in Removal of Piles and Growths," in which he insisted upon the employment of a good battery, which, if a storage-battery, should be well tested as to its connections.

He recommended heavy conductors of pure silver as less bulky and more flexible than copper; carbon and zinc plates, variously connected, so as to be portable, and not break; and broad connections, with as few breaks as possible.

The best battery-fluid is constituted of one ounce of sulphuric acid and eleven ounces of a saturated solution of sodium bichromate, which should be cold.

Dr. Cutter reported seven cases of various new formations in which employment of the method indicated yielded satisfactory results.

DR. A. H. BUCKMASTER, of Brooklyn, presented a report of "A Case of Retroflexion and Cystic Degeneration of the Ovaries Treated by Hysterorrhaphy Unsuccessfully and Cured by Electricity," occurring in a young, unmarried woman, in which three applications a week were made, with the clay electrode on the abdomen and a platinum tip covered with a large mass of moistened cotton in the vagina.

DR. G. H. WHITCOMB, of Greenwich, N. Y., presented a report of "A Rare Case of Twin Intra-uterine and Extra-uterine Pregnancy Treated by Electricity," occurring in a large, robust woman, thirty-six years old, who in the twelfth week of her second pregnancy, complained of sudden severe pain in the region of the left cornu of the uterus, with evidences of local peritonitis.

Under appropriate treatment the acute manifestations subsided. The uterus was anteverted and prolapsed, the cervix resting upon the perineum just above the sphincter ani and the fundus lying forward against the bladder, causing vesical tenesmus. The organ was unusually large for the corresponding period of gestation, owing to the previous hyperplasia and to the encroachment of a large mass on the left, which seemed to be continuous with, and a part of, the uterus. This body was as large as an orange and supplied with numerous pulsating vessels; not clear in outline, but firm and elastic in consistency. The uterus, from its size, shape, and consistency, unquestionably contained a fetus. The history, together with the conditions found, indicated as clearly as possible that there was also either a tubo-uterine or an interstitial pregnancy, or one in a rudimentary cornu.

With a ball electrode in the vagina below the mass, and a small flat electrode upon the abdomen directly over the mass, a mild and increasing faradic current was passed for fifteen minutes daily during two weeks. The symptoms improved continuously in all respects, though some pain persisted. The enlargement diminished noticeably. The impression gained by constant watching was that it had gradually receded into the uterus. At the end of several days a slight, dark-brown discharge, lasting for an hour, occurred, which returned on the following day, when it was attended by a periodical pain. Abortion promptly following, the patient expelled the fruits of a twin-conception. The cord of the fetus first delivered was broken; that of the second was attached to a placenta on the right side of the anterior wall of the uterus near the fundus.

In little more than a year the woman gave birth to a healthy child at term; and, so far as known, after an uneventful gestation and labor.

DR. A. G. HENRY presented "A Report of Three Cases of Uterine Tumors Treated with Galvanism," in which a thirty-two cell battery was used. As in neither of the cases a sound could be introduced into the uterus more than one and a half inches, a small olive-shaped tip for the intra-uterine electrode was employed.

In each case negative cauterizations were invariably made. The strength of the current ranged from twenty to seventy-five milliampères—usually after the first few applications from thirty-five to fifty-five. The duration

of the sittings was from five to ten minutes. In all three cases the treatment was successful.

#### NEW YORK STATE MEDICAL ASSOCIATION.

*Eighth Annual Meeting, held in New York City,  
October 28, 29, and 30, 1891.*

#### FIRST DAY—OCTOBER 28TH.

THE President, DR. STEPHEN SMITH, of New York County, delivered an address on "The Art of Teaching Medicine," in the course of which he said that every teacher should bear in mind Bacon's quaint saying: "He that questioneth much, shall learn much," and should not allow the student to be simply receptive. It would hardly be necessary to enunciate such well-known principles, but that the current methods of teaching medicine are unique. The medical student reads medicine; his individuality is lost in the class. The whole policy of most medical schools seems to be to make the professors and not the students the prominent feature.

The ideal method of teaching medicine would divide the classes into small sections, grading the students according to their individual capacity and proficiency. Recitations would be held at proper intervals, and practical demonstrations given whenever practicable. The knowledge of each student would be tested by examinations, before he would be permitted to pass to the next grade. That the ancient art of teaching medicine can be revived has already been practically demonstrated with gratifying success by one of the large metropolitan schools of medicine.

DR. ELBERT T. RULISON, of Montgomery County, read a paper on "The Use of Chloroform in Labor," in which he urged the more general employment of chloroform during labor, cautiously administered, avoiding complete anesthesia, in order to relieve pain, diminish shock, and avoid frequent ruptures of the perineum.

DR. OGDEN C. LUDLOW, of New York County, heartily indorsed the employment of chloroform in labor, which he preferred to ether in all cases except in those requiring severe and protracted operation, as he considered the greater control over delivery given by chloroform to more than counterbalance any dangers inherent in the anesthetic itself. The best inhaler, which is always accessible, is a tumbler, into which is pressed a handkerchief, or some absorbent cotton.

DR. M. W. TOWNSEND, of Genesee County, considered the routine use of any anesthetic during labor to be meddlesome midwifery. He deprecated the too common practice of administering anesthetics rapidly and in such a way as to produce partial asphyxia. In cases of labor in which he deems it necessary to employ chloroform, he has the patient to count aloud slowly, and when she ceases counting, the anesthetic is immediately withdrawn.

DR. GEORGE E. FELL, of Erie County, read a paper, entitled "Forced Respiration—Continued Observations," in which, in addition to the saving of five lives by himself and of one by a foreign physician, by means of this method of forced respiration, already reported, he stated that he had saved three more, and a number of other physicians had met with like success. While the method had chiefly been used in cases of

opium-poisoning, it would probably prove equally useful in cases of drowning and of traumatic shock.

Dr. Fell insisted upon his claims to priority, and exhibited the apparatus employed to carry out the procedure. He stated that forced respiration had been employed for many hours at a time without damage to the patient's lungs, and that on various occasions, when Sylvester's method of artificial respiration had proved utterly futile, this method had brought prompt relief, and in many instances, a cure.

DR. HENRY C. VAN ZANDT, of Schenectady County, read a paper on "Preventive Medicine," in which he deprecated the traditional reluctance of physicians to educate the masses on medical subjects, thus actually favoring the development of quackery. The advanced state of sanitary science among the Jews up to the time of their scattering abroad among other nations probably had much to do with their longevity. Modern sanitary science is responsible for a remarkable lowering of the death-rate in many of the principal cities, and an increase in the average duration of human life.

DR. JOHN SHRADY, of New York County, read a paper on "The Theories of Rheumatism," in which he admitted that a study of the much-vexed question of diet in its relations to rheumatism does not yet admit of definite conclusions; in this connection, however, the observations of Dr. Alexander Hadden on animals are interesting. He maintains that graminivorous animals are most commonly affected by rheumatism, and points to the frequency with which calcareous deposits take place in birds. Dr. Shraday was not willing to admit the truth of the microbic theory of rheumatism; he thought that the drift of modern opinion concerning the etiology of rheumatism was in the direction of an irritant seeking the most convenient way of escape from uncongenial surroundings.

DR. ALFRED L. CARROLL, of New York County, opened the discussion on "Acute Diffuse Peritonitis." He considered the histology of the peritoneum, a large part of which is devoted to suspensory purposes, or forms extravagant pouches, which give an enormous extent of endothelium, the stomata of which are connected with an elaborate system of lymphatics. In short, its function of lubrication is subordinate to that of absorption.

When exudation into the peritoneum takes place, it depends chiefly upon the etiology of the condition. The exudation is commonly plastic when the peritonitis arises by extension from adjacent inflammation, or as a result of contusion and manipulation. Dr. Carroll did not think it proper to ascribe the origin of the pus, and other cell-elements in peritoneal exudates, exclusively to the migration of leucocytes.

The part played by microorganisms, or by the products of fermentation caused by them, has not yet been determined; that is a problem for future bio-chemistry to solve.

The differential diagnosis is not infrequently a matter of some difficulty, because some cases pursue an afebrile course, or are even accompanied by a subnormal temperature, and because even the classical symptom, pain, may be absent. At first there are often only the physiognomy and the decubitus to guide the diagnostician. The diagnosis is still more difficult when diffuse

peritonitis supervenes upon preëxisting maladies, or upon traumatism.

Dr. Carroll emphasized the general proposition that the therapeutic indications are not only modified by, but are altogether dependent upon the causative factors. When intense pain menaces the heart, morphine is temporarily useful, but when surgical methods are as imperatively demanded as they are in cases in which the inflammation is caused by penetrating or strangulating lesions, no further reliance should be placed on this drug. In other than surgical cases peristalsis is a "bugbear," and is inconsistently dreaded, for, when tympanites occurs, peristalsis ceases. Small "persuasive" doses of calomel given at an early stage will often happily prepare the way for slowly administered enemata. Belladonna deserves more attention than it has hitherto received, as it deadens the sensibility of the nerve-centers and allays pain; it diminishes reflex irritability and tends to relieve constipation and to support the heart embarrassed by pulmonary compression as well as by its own enfeeblement. Some of the cases in which Mr. Tait achieved success by the early administration of Seidlitz powders may really have been instances, not of peritonitis, but of the "fever of non-elimination." When a purulent exudation is present, or is likely to occur, quinine, which retards the migration of leucocytes, is indicated. Stupes and light warm fomentations are more philosophical than the depressing refrigeration of ice-coils. In severe cases a tendency to a lowering of the temperature is often of evil omen, and when this exists it should exclude the use of all depressants.

DR. HENEAGE GIBBES, of Ann Arbor, presented a communication, in which he discussed the comparative anatomy of the peritoneum and the relations that the bloodvessels and lymphatics bear to this important membrane. He detailed experiments that he had made on animals: Fluids containing pure cultures of various microorganisms were injected into the peritoneal cavity, with negative results; but when such injections were made into the systemic circulation, plugging up of the vessels and other marked effects were observed. The lymph that exudes into the peritoneal cavity is apparently capable of rendering a certain quantity of noxious material innocuous. Tuberculous material had even been injected into the peritoneal cavity without the development of the slightest tuberculous inflammation of the peritoneum.

DR. VICTOR C. VAUGHAN, of Ann Arbor, in a communication, particularly considered the relation of microorganisms to peritonitis. No one species of organisms has been found to be invariably present. If the peritoneum be entirely free from irritation, the injection of germs suspended in distilled water has no effect, but if the suspension contain, for instance, bits of agar-agar, peritonitis follows the injections. Peritonitis can be induced by the injection of sterilized emulsions containing one drop of croton oil, the absence of microorganisms being proved by culture-experiments. Sterilized preparations of trypsin, injected into the peritoneal cavity, produce peritonitis; so that, aside from contained germs, the contents of the intestines introduced into the peritoneal cavity are sufficient to cause peritonitis.

DR. E. D. FERGUSON, of Rensselaer County, said that clinically there are cases that do not correspond with



the usual ideas of infective peritonitis—for example, cases with clear effusion, which recover completely, with or without paracentesis. Cases of toxemia sometimes closely simulate diffuse peritonitis. The object of treatment should be "to remove irritation;" but, of course, it is often difficult to determine the cause of irritation. Saline laxatives are often useful, when such remedies are not absolutely contra-indicated, and at the head of the list is to be placed magnesium sulphate.

DR. HAROLD C. ERNST, of Boston, accepted it as proved that most acute inflammatory and suppurative processes in the human body depend upon the activity of one or more forms of bacteria. As a result of some experiments that he had made, he concluded that acute peritonitis could not be produced in the lower animals except by the action of bacteria or their products.

DR. JOHN CRONYN, of Erie County, cited a case in which the diagnosis of metastatic tuberculous peritonitis in a patient having pulmonary tuberculosis had been fully confirmed by the post-mortem examination. A point of practical importance in the treatment of peritonitis is the administration of a combination of opium with quinine. By associating these drugs larger doses can be given without producing either narcotism or cinchonism.

DR. GEORGE T. HARRISON, of New York County, considered the subject from a gynecological standpoint. When peritonitis is well established, purgatives can only be harmful. He had never seen the symptoms ameliorated by warm applications, while the employment of ice-bags or coils moderates pain and peristalsis, often localizes the inflammation, and makes the patient comfortable without resort to large doses of opiates.

DR. WILLIAM MCCOLLOM, of Kings County, made a strong plea for the recognition of an idiopathic form of peritonitis, basing his position on the known liability of certain individuals to disease of the serous membranes, as well as upon his personal experience. At one time, while practising medicine in Vermont, where the winters are severe and the temperature very variable, he frequently treated cases of peritonitis occurring almost exclusively in males whose occupations exposed them to the inclemency of the weather. At the time referred to, Dr. Alonzo Clark was urging the adoption of the "opium treatment." Dr. McCollom had ever since employed this plan of treatment; he was loath to relinquish a method that had stood the test of about forty years of practice to take up the use of laxatives, a method of treatment that had proved most unsatisfactory.

DR. NICHOLAS SENN, of Chicago, considered the different varieties of peritonitis. He described the plastic form as a process that remains circumscribed, in this respect being widely different from septic peritonitis, in which the primary cause continues to multiply. Owing to the absence of pain and fever, and frequently to the existence of even a general feeling of well-being, many cases of virulent puerperal peritonitis are often not recognized during life. The pulse that rapidly rises to 150 or 200 per minute is, however, significant. Dr. Senn related the history of a case that he had recently seen, in which the diagnosis seemed to lie between ascites and a large ovarian cyst. He had himself looked upon the case as one of tuberculous peritonitis, with localized ascites. On performing laparotomy, nothing but a true ascites could

be found, and recovery followed the employment of drainage for several weeks. In fact, the case was one of hydrocele on a large scale—a passive form of peritoneal inflammation not due to infection from without, but to a loss of equilibrium between secretion and absorption. Dr. Senn expressed the belief that these cases are more common than is usually supposed. Reasoning from what is known of idiopathic inflammations of the meninges and pleura, he most emphatically expressed his belief in the existence of an idiopathic form of peritonitis.

DR. MARCY, of Boston, expressed the opinion that in cases of tuberculous peritonitis laparotomy often results in great benefit to the patients, although the reason for this may not yet be well understood. He cited an interesting case in which frequent and large tapplings of the abdomen failed to prevent rapid reaccumulation, but in which a cure was promptly effected by establishing permanent drainage. The explanation is probably to be found in the consequent relief of the mesentery from undue pressure. Dr. Marcy cited statistics showing the safety of exploratory laparotomy, and advised a more frequent resort to this valuable measure.

DR. T. D. STRONG, of Chautauqua County, reviewed the "Opium Treatment." The degree of tolerance to opium is to a certain extent a measure of the severity of the attack. In a very desperate case, in a boy ten years old, eighteen grains of morphine were administered in thirty-six hours, and the lad appeared in no way drowsy, but constantly complained of pain. When this point was reached, a change for the better appeared, and the boy made a slow but complete recovery.

DR. J. LEWIS SMITH, of New York, considered the subject of "Peritonitis in Early Life." No age, he stated, is exempt from peritonitis. It has long since been shown that the fetus sometimes becomes non-viable and perishes in consequence of peritonitis, and that the most common cause of this is inherited syphilis. Peritonitis may prove fatal before birth, or, if the child is born alive, death usually soon results. Peritonitis of the newly born is by no means uncommon: the inflammation is commonly caused by the entrance of septic matter into the system at the umbilicus, from foul umbilical dressings or from foul water employed in washing. The pathogenic factor resides in microbes.

Primary or idiopathic peritonitis is that form that occurs when there has been no antecedent disease that might give rise to it. Its occurrence is denied by some writers, but that it does occur, and not infrequently, is proved by a large number of cases reported by different observers.

During infancy and childhood peritonitis may occur from a considerable number of causes, as from septic infection or blood-poisoning; in connection with erysipelas; from disease of the abdominal viscera—more frequently of the hollow organs than of the solid viscera; as a result of appendicitis or typhilitis. Children less frequently than adults have ulceration of Peyer's patches in typhoid fever, but it sometimes does occur, with subsequent perforation and fatal peritonitis. Another cause of peritonitis is traumatism. A case of fatal peritonitis is on record following tapping for a congenital hydrocele. In females, peritonitis may result from gonorrhea, the inflammation passing from the

vagina to the uterus, and thence through the Fallopian tubes to the peritoneum. Tuberculous peritonitis occurs much more frequently in infancy and childhood than in adult life.

The symptoms of peritonitis in children are usually quite distinct, although in some cases they are so obscure that it is very difficult to make a diagnosis. The treatment must be instituted early and must be judicious. The indication is to subdue the inflammation as soon as possible and at the same time to employ such dietetic and medicinal remedies as will sustain the strength and prevent heart-failure, which is the ordinary cause of death. It is important that the patient should remain quietly in bed, with the least possible movement of the body and lower extremities. In the ordinary forms of peritonitis, purgatives act injuriously in children, as in adults. During the active period of the disease it is better not to employ any treatment whatsoever for the purpose of opening the bowels, even if one or two weeks elapse without a stool. As for drugs, opiates are the chief reliance. They relieve not only the tenderness and pain, but also the vomiting, and produce a quiet state of the intestines. The remedy should be given in doses sufficiently large to produce this effect. A child of twelve years can take half a grain of opium every two or three hours, or sufficient to secure sleep. The removal of the cause of the disease, if it can be effected by means of a surgical operation, should be carefully considered.

DR. E. G. JANEWAY, of New York, stated that the diagnosis of acute peritonitis is at times extremely difficult. Tympanitic distention of the bowels may be present, as well as pain and fever, without any peritonitis; it is only by closely watching such cases that a correct conclusion can be arrived at. Dr. Janeway reported the case of a boy, four years old, who presented high fever, constipation, and pain in the right iliac fossa, with tenderness so considerable that he had to be examined under chloroform. This condition continued for four days, all of the symptoms indicating peritonitis. On the fourth night the boy slept well, on the following morning his temperature was 99°, and two days afterward he was well enough to go out. A pneumonia or a pleurisy may cause reflex pains in the abdomen, with marked distention. The symptoms of peritonitis may also be simulated by hepatic colic—more rarely by renal colic; in either condition there may be fever, distention of the abdominal walls, and pain. Then again, there may be cases of peritonitis accompanied by diarrhea, without fever and with very slight pain.

DR. NICHOLAS SENN, of Chicago, delivered the Address in Surgery, taking for his subject "The Surgical Treatment of Pyloric Stenosis." He divided the subject into, first, the operative treatment of cicatricial stenosis of the pylorus; second, the operative treatment of carcinoma of the pylorus. He stated that cicatricial stenosis of the pylorus frequently follows adjacent ulceration or traumatism. At first the symptoms are those of obstruction to the passage of the food, to which subsequently those of compensatory hypertrophy and dilatation of the walls of the stomach are superadded. The operative treatment of a cicatricial stricture at the pyloric extremity of the stomach consists in performing pylorotomy; in digital division of the stricture through the wound in

the stomach; and in the formation of a new pylorus by the pyloro-plastic operation of Heineke-Mikulicz; or, in establishing a new outlet from the stomach into the small intestine by performing a gastro-enterostomy.

Dr. Senn reported fifteen cases in which he had operated for the relief of pyloric stenosis, and presented the following propositions:

1. Pyloroplasty, as devised by Heineke-Mikulicz, is the safest and most efficient operation for cicatricial stenosis of the pylorus.

2. Pylorotomy is a justifiable procedure in the treatment of carcinoma of the pylorus when the disease is limited to the organ primarily affected, and when the patient's general health furnishes no contra-indication.

3. In the treatment of malignant stenosis of the pylorus, gastro-enterostomy, with the aid of large, moist, perforated plates of decalcified bone, should be resorted to as soon as a positive diagnosis can be made and a radical operation is contra-indicated.

(To be continued.)

## CORRESPONDENCE.

### THE TRANSMISSION FROM ONE PERSON TO ANOTHER OF THE POISON OF RHUS TOXICODENDRON.

To the Editor of THE MEDICAL NEWS,

SIR: In a contribution to THE MEDICAL NEWS (Oct. 24, 1891, p. 484), entitled "Unusual Mode of Transmission in a Case of Dermatitis Venenata," Dr. Cantrell states that he had found "but one parallel case" to the one therein reported, "wherein the disease was contracted by the mere handling of a person affected."

In 1873 (*Amer. Journ. Med. Sci.*, vol. lxvii, p. 436) I reported the following cases:

"In June, 1871, Mrs. V. suffered very severely from a burning and itching eruption covering her entire face, neck, both mammae, external genitals, extending along the inner surface of both thighs, both hands, wrists, and portions of her abdomen. Her husband, at the same time, suffered with a similar eruption, though not so severe, on both hands, and an infant had it very slightly about the mouth and chin. A week previous to the appearance of the eruption, the husband and wife had passed an afternoon at a picnic, and he had fastened his horse to a bush covered with a vine, the character of which he had not observed. The wife did not approach the plant, and the child had been left at home."

In the commentary following the report of these and other cases, I called attention to the readiness with which the poison "can be conveyed to other parts of the body by the contact of the part which may have received the poison from the plant, and from one individual to another, even though the first may not at all, or only very slightly, suffer from its poisonous action." This conclusion was reached after an extensive, and, as I supposed, an exhaustive examination of the literature of the subject. As it is admitted that the poison may be conveyed by the hands to other parts of the body, it would seem clearly admissible that one person should transmit it to another, by actual contact, even though the first might not be susceptible to the poison.

In conclusion I recall attention to the fact, cited in the article previously referred to, that Dr. Canfield,<sup>1</sup> of Monterey, Cal., as early as 1859, reported the successful treatment of the disease with the local application of the balsam-like juice of the *Grindelia robusta*.

SAMUEL C. BUSEY.

WASHINGTON, D. C., October 27, 1891.

#### POISONING BY IVY AT SECOND HAND.

To the Editor of THE MEDICAL NEWS,

SIR: The case of Dr. Cantrell, reported in THE MEDICAL NEWS of October 24th, reminds me of a similar instance. Miss E. W. spent the night with her sister, Mrs. C., whose husband was obliged to be absent on business. Mr. C. had been poisoned about the head and neck with ivy a few days before leaving home. The pillow-case on which he slept was not changed, and his sister-in-law, using it, became poisoned about the face and neck in consequence thereof, no other opportunity for contracting the disease existing.

While on the subject, I would like to call attention to a plan of treatment that I have found most successful. As everyone of experience knows, the success with the ordinary remedies employed varies greatly, relief sometimes being prompt and at others most tardy. The fluid extract of Virginia snakeroot (*serpentaria*) is undoubtedly a specific. Applied to the irritated parts in full strength, "sopped" on, repeating the application from every two to four hours early in the attack before an eczema is engendered, it will promptly arrest the disease and act as an antidote. I have used lead-water and laudanum, solution of carbolic acid, lime-water applications, sodium solutions, *grindelia robusta*, and most other so-called remedies, but with none was I sure of a satisfactory result. With the *serpentaria* the result is certain as well as speedy. I need scarcely add that the suggestion is not original with me. Yours very truly,

J. B. WALKER.

1617 GREEN ST., PHILA., October 26, 1891.

#### SUPERNUMERARY FINGERS AND TOES.

To the Editor of THE MEDICAL NEWS,

SIR: In THE MEDICAL NEWS for April 13, 1889, I reported the case of a colored child that had a supernumerary digit attached by a thin pedicle to the outer side of each hand. The extra fingers were removed.

Another case was that of a white adult who had six well-developed toes on each foot, and had also, at birth, six fingers on each hand, as in the first case reported. The extra members were removed in infancy.

Since making the above report, I have observed a number of cases of supernumerary toes and fingers. Mr. N., a white man, has two children, one having six well-developed fingers on each hand and six well-developed toes on each foot; the other child having six well-developed fingers on his left hand and six well-developed toes on his left foot.

A colored woman had six children (by about as many men), each child having six fingers on each hand and six toes on each foot. The extra members, none of

which were thoroughly formed, were all removed in infancy. In none of the foregoing cases were the anomalies inherited or transmitted.

Again, a colored man has been the father of seven children (six of whom had the same mother), five of whom were born with a supernumerary finger attached by a pedicle to the outside of each hand, and an extra toe attached in the same way to each foot. One child had six fingers on each hand, the feet being normal. The hands and feet of the other child were normal. All the extra fingers and toes were almost thoroughly developed, having bones, joints, and nails. The extra members were all removed without trouble. In this instance the anomaly existed in children, father, and paternal grandfather—a somewhat interesting and remarkable fact. I have made no special effort to collect these cases, they having been incidentally met with.

Very respectfully,

W. F. DREWRY, M.D.

CENTRAL LUNATIC ASYLUM, PETERSBURG, VA.

#### OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF OFFICERS SERVING IN THE MEDICAL DEPARTMENT, U. S. ARMY, FROM OCTOBER 27 TO NOVEMBER 2, 1891.

BALL, ROBERT R., *First Lieutenant and Assistant Surgeon*.—Granted leave of absence for one month, with permission to apply for an extension of one month.

MAUS, LOUIS M., *Captain and Assistant Surgeon*.—Is relieved from duty at Whipple Barracks, Arizona Territory, and ordered to Fort Apache, Arizona Territory, for duty.

RICHARD, CHARLES, *Captain and Assistant Surgeon*.—Is relieved from duty at Fort Logan, Colorado, and will report in person to the commandant of the Military Prison, Fort Leavenworth, Kansas, for duty.

#### OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF THE MEDICAL CORPS OF THE U. S. NAVY FOR THE WEEK ENDING OCTOBER 31, 1891.

HARVEY, HENRY P., *Surgeon*.—Ordered to Receiving-ship "St. Louis."

FLINT, JAMES M., *Surgeon*.—Detached from the Smithsonian Institute, and ordered to the U. S. S. "Miantonomoh."

HEYL, T. C., *Surgeon*.—Detached from Receiving-ship "St. Louis," and wait orders.

#### OFFICIAL LIST OF CHANGES OF STATIONS AND DUTIES OF MEDICAL OFFICERS OF THE U. S. MARINE-HOSPITAL SERVICE, FOR THE TWO WEEKS ENDING OCTOBER 24, 1891.

PURVIANCE, GEORGE, *Surgeon*.—Upon completion of duties as Chairman of Examining Board to Inspect Marine Hospitals at St. Louis, Mo.; Cairo, Ill.; and Cincinnati, Ohio, October 16, 1891.

GODFREY, JOHN, *Surgeon*.—To represent the Service at the meeting of the American Public Health Association, October 14, 1891. To inspect Marine Hospital at Louisville, Ky., October 14, 1891.

CARTER, H. R., *Passed Assistant Surgeon*.—Granted leave of absence for thirty days, October 17, 1891.

PETTUS, W. J., *Passed Assistant Surgeon*.—Orders to Norfolk, Va., revoked; to proceed to Cape Charles Quarantine for temporary duty, October 14, 1891.

KINYOUN, J. J., *Passed Assistant Surgeon*.—To represent the Service at the meeting of the American Public Health Association, October 17, 1891.

PERRY, T. B., *Passed Assistant Surgeon*.—To proceed to Norfolk, Va., for temporary duty, October 14, 1891.

GUITERAS, G. M., *Assistant Surgeon*.—To proceed to Gulf Quarantine for duty, October 20, 1891.

ROSENAU, M. J., *Assistant Surgeon*.—Granted leave of absence for thirty days, October 24, 1891.

<sup>1</sup> American Journal of Pharmacy, vol. xxxii, p. 414.